February 1961

Management *and* BUSINESS AUTOMATION

THE ELECTRONIC CRYSTAL BALL

Operations Research takes guesswork out of management

page 16

A New Concept in Accounting

page 22

THE EAVESDROPPER

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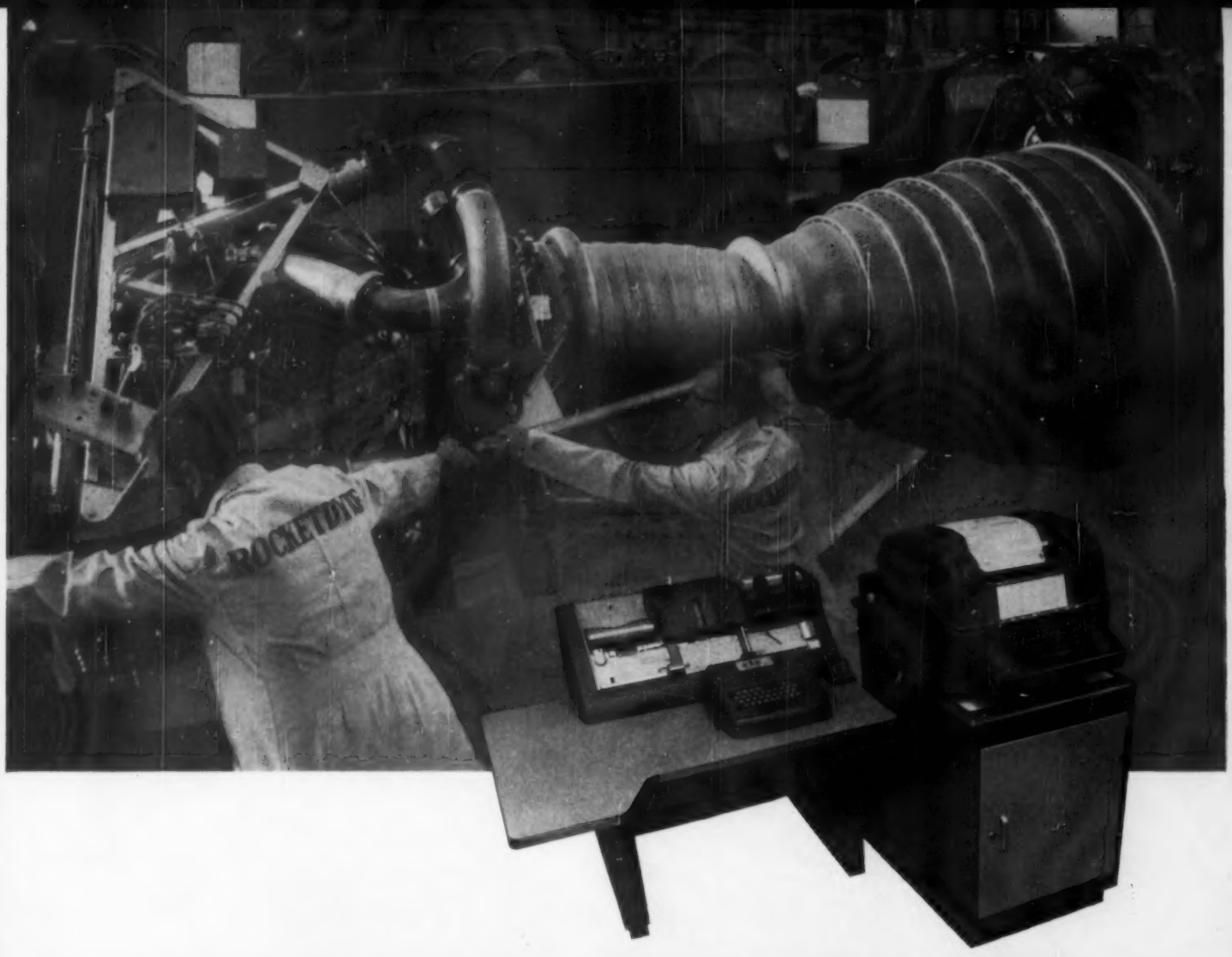

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Management
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BUSINESS AUTOMATION

February, 1961
Vol. 5, No. 2

New ideas, developments, applications, results, and the human impact of business automation in commerce, industry and government.

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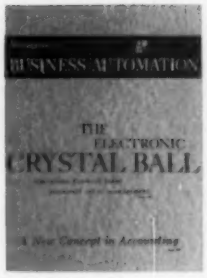
Scanning the issue



MANAGEMENT'S increasing demand to know more about the scientific management method of Operations Research, in language that businessmen can understand, has prompted another edifying article on that subject. Working closely with the pioneer Operations Research firm of Caywood-Schiller, Associates, a "depth" compilation of OR is presented giving more of the background, approach and practical application of OR techniques. **Operations Research—Management's Crystal Ball,** page 16, is written to take the "mystery" out of OR and to show it as a scientific concept of management that is basically simple and understandable, even to the layman. If the reader feels daring, he might try solving the OR problem found on pages 18 and 19, which should illuminate clearly the need for a scientific approach to today's business problems.

Our first introduction to the technique, **Operations Research—What, Why, Where and How** (August 1960, page 30) was authored by R. Hunt Brown, now contributing editor to Management and BUSINESS AUTOMATION. Since that time this magazine's publisher has purchased Mr. Brown's EDP newsletter and loose leaf service, Automation Consultants, Inc. (see page 60).

The progressive management philosophies of American Bosch were illustrated last Spring when the company unveiled their Management Operating Systems (MOS). While all the "noise" was about MOS, a "total systems" approach to production control, Management and BUSINESS AUTOMATION learned that this was only part of an overall effort of American Bosch to apply "total systems" to their entire organization. The task force headed by John Field had initiated MOS and was working on an accounting concept, of far more reaching consequences to general management, which they called Continuous Flow Modular Accounting. Now that CFMA is also a proven success an exclusive report is presented on page 22, **New Accounting Concept Based on Assembly-line Processing.** Field admits that the CFMA system was first conceived as a somewhat "odd-ball" idea, because it uses the old-fashioned concept of posting source documents as they are received.

This issue also contains the second part of **Effects of Business Automation in the Sixties,** page 28. (See January 1961, page 18 for part one.) In this conclusion of the round-table discussion, the six experts on the panel delve deeply into the problems that will face middle management in the present decade, the proper and extended use of "simulating" the results of "today's" business decisions and the growing need for speedier "paperless" systems in business to match modern computers.

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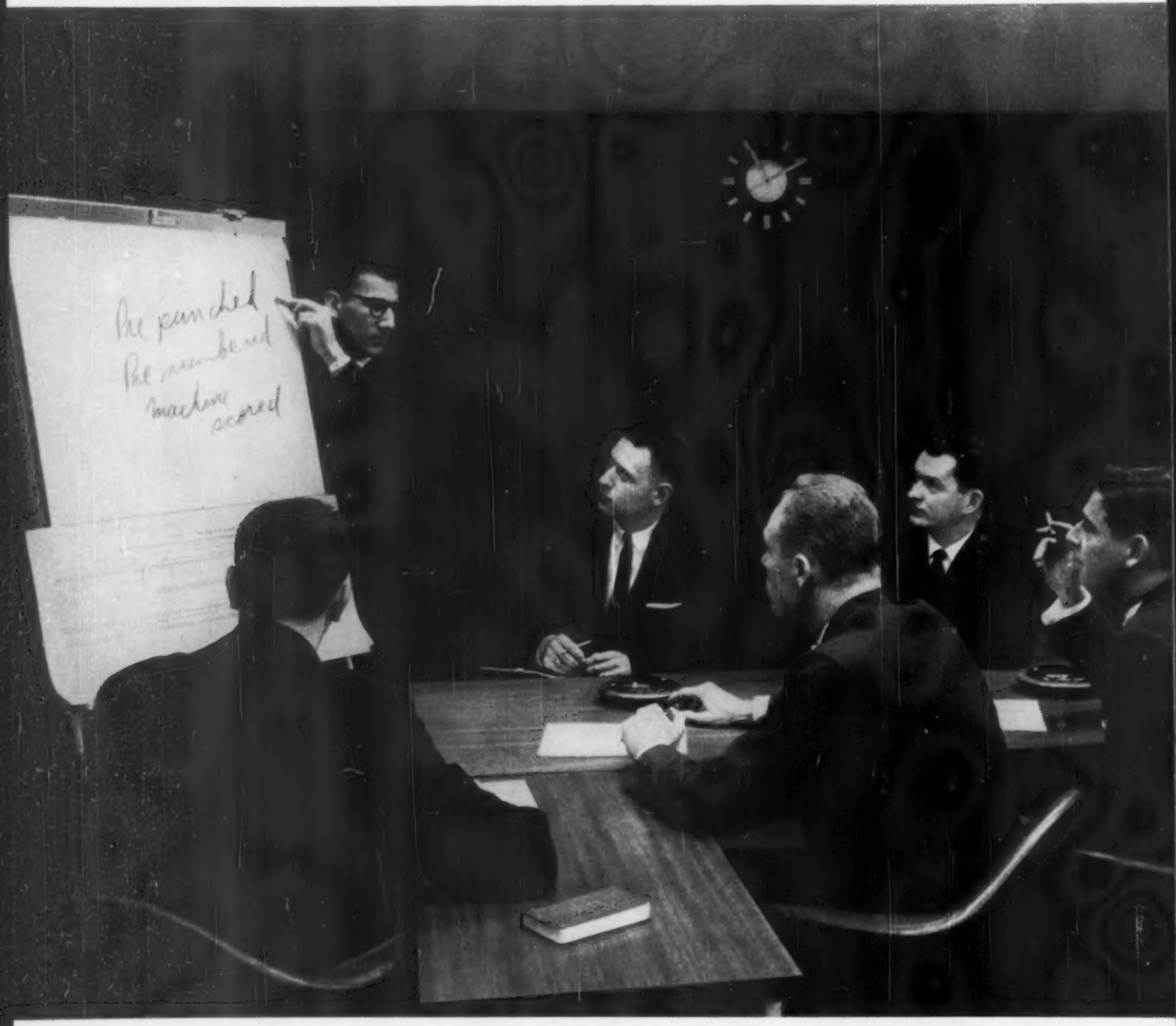

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Information bits from the Editor's memory file

Election Post-mortem

Dr. Eugene E. Lindstrom, who directed the election night computing activities for the IBM/CBS team, takes exception to our comments in last month's column, which indicated that an error in programming was responsible for the early prediction of a Nixon victory. According to IBM; "The performance of our computers at their three tasks on election night—forecasting, analyzing and tallying—was highly successful. Whatever misconceptions arose over the very early Nixon projection were due to misunderstanding of the procedures we were using rather than to errors in programming."

As IBM officials explain, there are two general ways to forecast an election with computers. One involves creating a mathematical "model" of the voting public based on all the variable factors which can be evaluated. (This approach was similar to RCA/NBC's.) The other is based on a purely statistical comparison between voting records in the current election and those of the previous election. In supporting CBS's news coverage of the 1960 contest, IBM chose the statistical approach.

Dr. Lindstrom points out that, "this method relies upon fewer assumptions concerning a population about which we have little proven current information. It involves only two assumptions: first, that election returns will be reported in the same sequence as the previous election, and, second, that there has been no significant change in the makeup of the population during the last four years. While neither of these assumptions will be entirely correct, the possibility of error can be more directly isolated and measured than in the first forecasting method."

At 7:26 p.m., (EST), with fewer than one percent of the nation's precincts reporting, the IBM's computer reported odds favoring Nixon. Later events proved that this projection was overweighted by Kansas, which had reported its votes almost three hours earlier than in 1956, giving Nixon more votes than it had given Eisenhower, a "trend" factor which quickly lost significance as more votes came in.

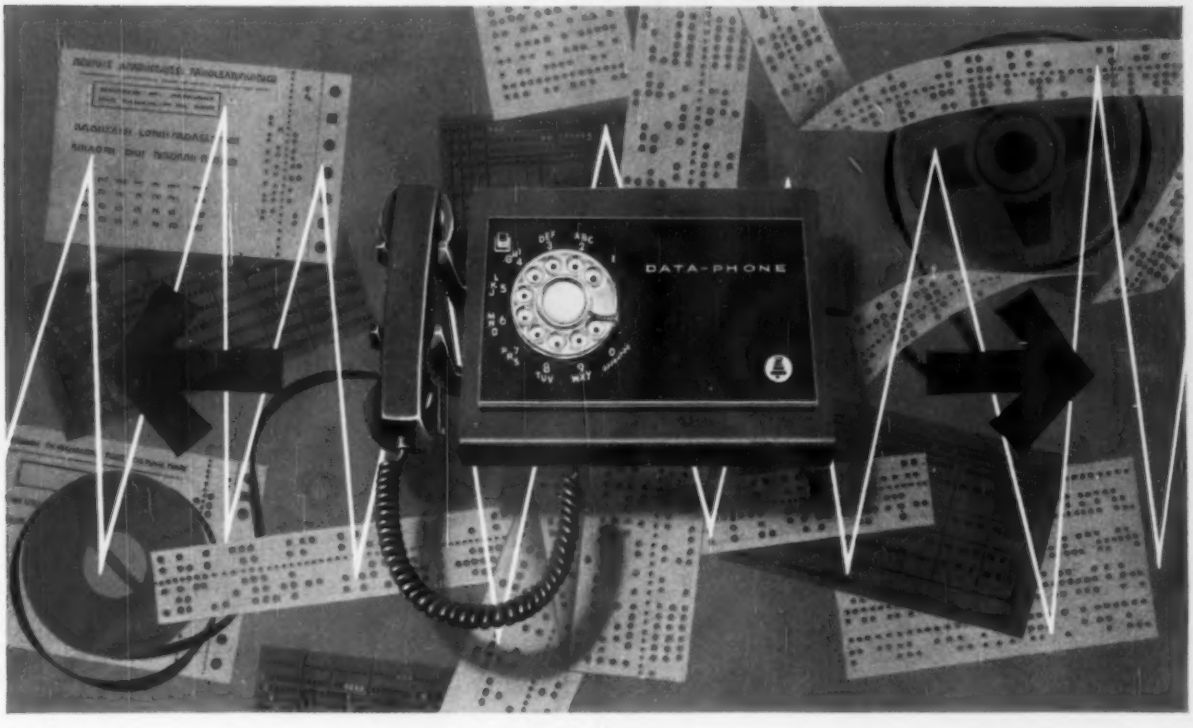
At 7:50 p.m., with three percent of the nation's precincts reporting, and one hour after the first polls closed, the computer forecast a Kennedy victory with odds of 11 to 10, giving Kennedy 297 electorial votes—only six less than the official tally of 303. It also projected a 50 percent popular vote for each candidate.

As the projections did eventually "home in" on the correct final result, Dr. Lindstrom is probably justified in his insistence that "no programming error was involved."

The fact remains, however, that although not enough votes had come in to support a valid forecast, the "7:26" report was released—in error. Such an error in business forecasting could be fatal to the company involved. "Assumptions" and "taking things for granted" are poor essentials for computer procedures or programming.—A. E. K.

Have you heard about the new Bell System service that lets modern business machines talk with each other over regular telephone lines? Its name is

DATA·phone



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Data-Phone can speed the handling of accounting and billing information, inventories, payrolls, invoices, sales orders and numerous other forms of business data. And it is compatible with an ever-increasing number of data-processing machines in use today. Many business firms already have it.

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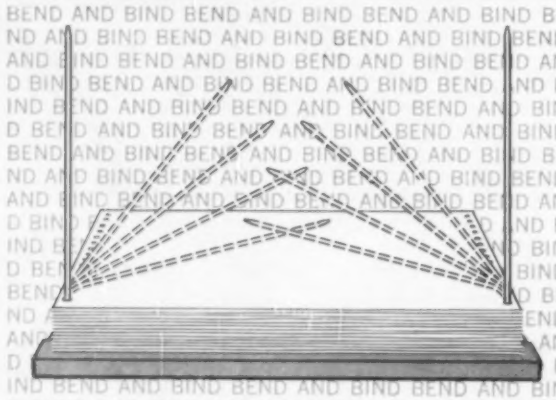

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from the Publisher's Desk

SINCE January 3, Automation Consultants, Inc. has been owned and operated by The Office Appliance Co., which publishes this magazine. As many readers are aware, Automation Consultants publishes Office Automation and Office Automation Applications, the two standard loose leaf references in this industry.

For those who are, or may become, subscribers to the monthly updating services of these handbooks, we want to assure that the past high standards will be maintained. In fact, our long range plans for the future will see the addition of new subject material of considerable value to anyone concerned with business automation and data processing. However, it should be pointed out that Management and BUSINESS AUTOMATION and the handbooks will not overlap, as each has its own specific function.

One of the popular publications of Automation Consultants has been the monthly OA News Bulletin. In order to provide the fastest possible news service, we are increasing the frequency of the bulletin to bi-weekly. This will result in less space in Management and BUSINESS AUTOMATION devoted to spot news and more to depth treatment of the most important news events of the month.

The bulletin has a new name, BUSINESS AUTOMATION NEWS REPORT, reflecting the full coverage of its subject material and stressing that it serves as a regular management report. The bi-weekly schedule and new name are both in effect with the current issue.

We are now in a position to offer the only complete editorial service available to executives concerned with business automation and data processing, encompassing up-to-the-minute news, in-depth features on management problems, detailed descriptions of EDP hardware and actual case studies of successful applications.

Editorial Director of all publications is our very able Arnold Keller.

Charles W. Gilbert

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Letters

Dear Sir:

Of particular interest to us was the article on Jonkers Business Machines Co., in the November issue, concerning their activity in information retrieval systems. Our firm was formed by the technical staff of Brisch Inc., of Toledo, subsequent to the death of the founder, Mr. Edward Brisch, who was a pioneer in the field of classification and coding as well as information retrieval in this country and in Europe. In this prior connection we have installed several systems based on the "peekaboo" concept to control various types of information in industry. It is our opinion that there is great opportunity for the application of these techniques to the problems of information search, and we are happy to see Mr. Jonkers enjoying such success.

We do feel, however, that it is unfortunate that credit was not given to Mr. Batten in England, or to Mr. Wildhack at the National Bureau of Standards, for their extensive work in the development of the "peekaboo" techniques. There have been very few significant improvements on the devices developed at N.B.S. a few years back.

Giles E. Lovelace
Lovelace, Lawrence & Co., Inc.
Management Consultants

Dear Sir:

The editorial "'Educated' Data Processing," in your December 1960 issue, could not, in my opinion, be more correct and timely. I wish there were some way of making it required reading for both line and staff management concerned with data processing, accounting and office management.

The failure of management people, including top-level executives, to have a sufficient working knowledge of the capabilities of available office equipment has several unfortunate results including:

1. Absence of the essential "creative" atmosphere in which staff people can develop effective systems application.
2. Lack of adequate backing for breaking down barriers that prevent use of the "total systems" and "management by exception" principles.
3. Unwillingness to invest in the future, as done in other functions of the business such as research and manufacturing, without having a provable payoff period of short duration. Many equipment acquisitions for new systems applications must be decisions partially based on faith in the systems planner's ability to utilize the equipment properly, despite the fact that not all future applications can be foreseen.

I have been reading Management and BUSINESS AUTOMATION regularly since its inception, and I believe that you are making a real contribution to management.

W. M. Carrithers
Controller
A. B. Dick Co.

Dear Sir:

I recently read your editorial, in the September 1960 issue, regarding the article in the July-August issue of the Harvard Business Review, entitled "When the Computer Takes Over the Office."

May I say that my reaction was comparable to yours. Until reading your editorial, I had wondered whether my reaction was simply a biased one, since I am involved in the EDP field. However, I think the erroneous aspects of the article stem from, to quote your editorial, that "the author arrived first at a conclusion and then wrote a story disregarding along the way any facts that would tend to refute her original thesis."

While I am writing to you as an individual and not as a representative of Remington Rand, I do feel that such articles do a disservice to the data processing industry. It would be well for the Harvard Business Review, considering its normally high caliber of reporting, to do a more thorough job of reviewing the articles it publishes for its readers.

D. D. Peterson
Assistant for Management Reporting
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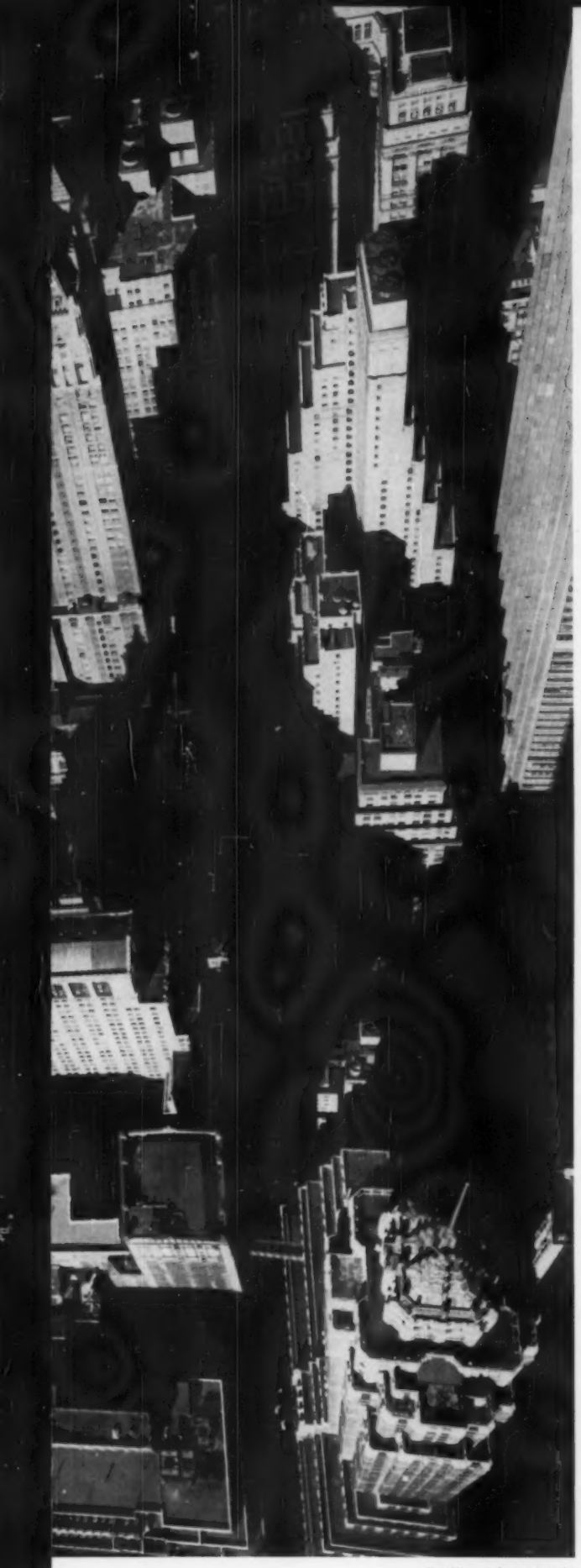

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By bringing the new dimension of scientific research to management the "modern art" called Operations Research is a boon to the businessman who can't afford to be wrong.

Operations Research—
Management's Crystal Ball

A NEW DIMENSION—the dimension of science and scientific research—is revolutionizing American management's approach to tough problems and big decisions. The perilous guesswork that has plagued harried executives from the time of the tycoons to today's more prevalent management committee is being eliminated. In place of guesswork, a small but steadily growing number of companies are relying on the modern art of Operations Research.

At a time when management can make a single miscalculation or error in judgment and cost the company hundreds of thousands—or even millions—of dollars, Operations Research provides a new and exciting form of profit insurance. This boon to the businessman who can't afford to be wrong performs three vital functions. It helps management (1) avoid costly mistakes, (2) discover new ways to cut costs and increase earnings, and (3) deal with phenomena in this age of automation about which management has had no experience.

How? By combining high-speed electronic computers with advanced mathematical techniques, Operations Research (OR) offers a scientific approach to business problems and a scientific method to arrive at important decisions. By applying the tools and techniques of science to what was once considered an intangible art, OR is helping to board up the corporate closet reserved for skeletons of executives who lose in the businessman's version of Russian Roulette.

In effect, the modern businessman can now look at his problems through a microscope instead of bifocals.

Operations Research on a problem will reveal various alternate courses that management may follow in making a decision. It evaluates each course in quantitative terms, and it even projects into the future to alert management to the consequences of today's action 5, 10, 20 or even 50 years from now. It was once expressed as "almost like having a crystal ball at your disposal."

Proving far more accurate than a crystal ball, OR has already performed a wide variety of feats such as developing methods to increase production without increasing production facilities and to manufacture products at startling reductions in cost.

OR is a newcomer to the business community, but the list of users is growing at an almost daily rate. At present, an estimated five percent of the nation's business organizations either have their own Operations Research departments, employ outside OR consultants or use a combination of both. The list of corporate users becomes impressive when it is pointed out that more than 60 of

the nation's 100 biggest firms are included. Almost invariably, the list includes giants in each industry such as General Motors, General Electric, Standard Oil of New Jersey, United Air Lines, Sears Roebuck and the Bank of America.

The technique of Operations Research, and its name, came out of World War II. During the crucial Battle of Britain, when England was threatened with annihilation by Germany's giant air armada, a team of top British scientists was given what seemed like an impossible task—find a way to keep the numerically superior Luftwaffe from blowing England off the map by making it possible for the vastly outnumbered British flyers to hold off Goering's gargantua until Allied plane production could be increased.

History and Winston Churchill paid tribute to the accomplishment of the scientists' mission. They came up with an amazing allocation and maintenance scheduling plan to put the few British planes at the right place at the right time so that the limited number could be used most effectively. To do this, however, the scientists also had to take into account factors such as where the Germans could be expected to strike, when and in what force. The astounding new science was called Operations Research because that's what the scientists did—they researched an intended military operation.

OR's next impressive success, establishing it firmly as an indispensable military aid, came with the Normandy invasion. Top military decisions on matters such as how many men to use on D-Day, where to use them and when—all were based on OR studies. After service as a spectacular recruit in World War II, the technique was put to work on top-level problems of national defense, proving highly efficient in this age of rockets, guided missiles and orbiting satellites.

A new and powerful tool

OR came of age as a new and powerful tool for management in the early 1950's when pioneers such as Thomas E. Caywood, one of America's first OR scientists, and Donald H. Schiller, an early associate, recognized basic similarities between military and business operations. They began to apply many of the same techniques to solve business problems as they had been using on military problems.

Since it was organized in Chicago, as an OR consulting firm with a top-secret facility clearance to do advanced military research, Caywood-Schiller has expanded activities in the corporate field to the point where it now does about half its work for the Department of Defense and the other half for business customers—still using the same sci-

Can We Fire The Executive?

If OR can quantify the alternatives in decisions, can we not dispense with the executive? The temptation is to envision the absent-minded, humorless scientist, coldly pushing buttons on an electronic computer as he sits at the ex-manager's desk. The answer to the question, however, is a resounding *no*.

Most major decisions must deal with a mixture of physical, mathematical, and statistical facts, and also with moral, political, psychological, timing and morale factors. Elements of personnel appraisal and just plain business judgement are also present. The role of OR is to remove the guessing, insofar as this is possible, from all measurable aspects and thus leave more time for the skilled executive to deal with the intangibles. He ultimately integrates all factors into the decision.

To be sure, clean-cut problems which are almost entirely quantitative appear occasionally. In these cases OR can remove drudgery from the executive by supplying a numerical indication of the best decision. However, adeptness in decision-making will continue to be the touchstone of success.

It is conceivable that an experienced analyst may be invited to assume executive responsibilities. This has happened in the insurance business, where actuaries have assumed important executive positions. While such a situation may work out well because of the all-round excellence and broad experience of the man involved, the individual becomes an executive, with executive duties. It will be hard for him to find the time and frame of mind to perform the same methodical, dispassionate analyses which he did as an OR worker. The background, motivation and methods of procedure of the OR scientist and the executive are opposites and hence complementary.

The executive has probably had business training and a liberal education, with perhaps a smattering of law. His on-the-job training has fitted him for command, with increases in responsibility as time went on. He is often compelled to arrive at decisions without all the facts and a thorough analysis. He is judged by his percentage right decisions.

The scientist has received advanced training in a narrow field and knows painstaking research from personal experience. His answers have not been required by a specific time or date. He is trained to check and recheck all his conclusions. He has no personal attachment to the answers. He just wants the facts.

George W. Morgenthaler,
Caywood-Schiller, Associates.

Reprinted from "Operations Research: Decision Aid for Management." Copyright 1960, by the Industrial Relations Center, University of Chicago.

entific tools and mathematical techniques for both.

There are not a large number of such tools or techniques, and they are mostly extremely complex, but an expert can manipulate them in an endless variety of ways to fit almost any given situation. It is the scientific way of arriving at decisions that is all-important.

Let's quit arguing

The bigger the decision, the more careful management must be because the wrong decision could be disastrous. Without the benefit of OR, a management team could—and often does—spend many months in debate and discussion. There are always conflicting facts and opinions. The sales manager may present one side of an argument backed by an impressive array of statistics, while the controller may take an exactly opposite view backed by equally impressive statistics. The rest of the team takes one side or another and the debate goes on.

When management turns to OR, it, in effect, says "Let's quit arguing and get the facts. Let's find a quantitative basis for decision, rather than the qualitative (and often personally biased) basis we're using now."

A major railroad recently encountered a problem involving a route that was in need of extensive repair. The question was should the route be renovated or abandoned. Maintenance pressed for abandonment, arguing that the route would be too expensive to repair and to maintain. Sales took an opposite view, asserting that abandonment would be a substantial reduction in sales.

This is a common management problem. It involves two important but conflicting points of view. How can the issue be resolved and the proper decision be reached? Both sides have good prima-facie cases. What can be done to insure future profit? How can a decision be reached without one side or the other feeling that it was arbitrary? Without OR, the various available facts are examined and weighed, and then business experience and judgment are used to reach the final answer. There is, however, likely to be an element of pure guesswork in the final decision. Management *THINKS* it made the right decision, but it can't always be *SURE* it has.

Operations Research presents a completely different basis for the decision. Avoiding what could result in a bitter, internal dispute, the president of the railroad retained Caywood-Schiller to study the route problem objectively, thoroughly and sci-

OR Solves a Problem in Formulating Animal Feeds

The problem of formulating animal feed serves as a good example of a general field of problems—blending of ingredients into a minimum cost mixture, meeting specified quality requirements.

Farmers are very scientific about feeding pigs, cows and chickens. Most commercial animal feed preparations are sold with a guarantee that minimum daily requirements of various dietary elements, such as protein, calcium, and riboflavin, are provided. These required amounts can be met in an almost unlimited number of alternative mixes by varying the proportions of such food components as corn, wheat, meat scraps, soy beans, or others. Each such mix, however, costs a different price to produce. One mix both meets the dietary requirements and is the cheapest to produce.

The problem is complicated by the fact that cost differences exist between each one of the many feed producing plants in the United States, and also these costs fluctuate from week to week in any one location.

The illustration at the right pictorally represents the salient features of the problem: (1) The producer has a number of natural food elements at his disposal, each with a known nutritional analysis; (2) The cost of these ingredients is readily available and may vary from time to time; (3) The nutritional requirements for a particular purpose feed (i.e. calf feed) has been determined by the U. S. Department of Agriculture.

To fill the box car in the picture (10,000 lbs.) with calf feed, one has to consider hundreds of possible ingredient combinations—many of which satisfy basic requirements—but which one at minimum cost?

It is doubtful that the reader, using conventional computation techniques, can determine the proper solution of this greatly simplified problem in less than several hours. Yet, by using Linear Programming and a high-speed computer, the answer can be determined in a matter of seconds. The value of this approach becomes more meaningful if one considers the actual problem, rather than the example illustrated. Actual animal feeds may have as many as 26 specific nutritional requirements and there may be as many as 50 ingredients available for blending. The company may process several hundred such specified feeds. Under these conditions the problem is completely beyond human intuition.

If the reader has attempted to work out the feed formula, he can compare his answer with the solution, as determined by Operations Research techniques, which appears on page 21. It meets all requirements and offers a minimum cost per bushel.

entifically. The consulting firm researched all anticipated operating and capital expenses and revenues pertaining to the repair and continued operation as against discontinuance of the route in question, including costs and revenues that could be expected if the cars were to be re-routed over other parts of the railroad's maze of networks. These factors were then subjected to the ubiquitous tax and interest considerations.

Finally, Caywood-Schiller constructed a mathematical model of the factors involved (the OR technique) and programmed its Bendix G-15 computer to project for each of the next 50 years the interactions and effect of the various cost and revenue figures on the road's financial status.

Homogeneous products

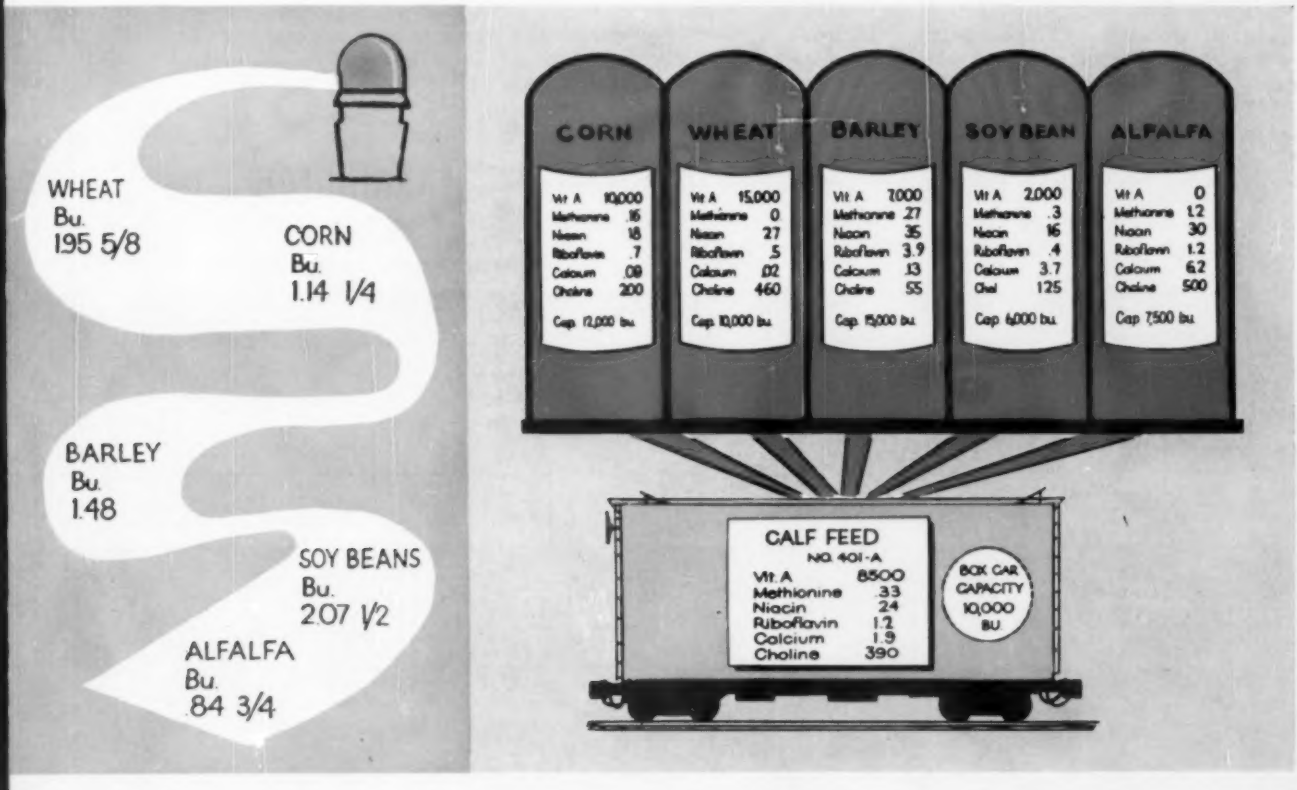
The net effect of the analysis showed that in a few years the route would change from a money-maker to a perennial money-loser. Management's course was clear. A scientific study based on an irrefutable mathematical model showed the route should be abandoned.

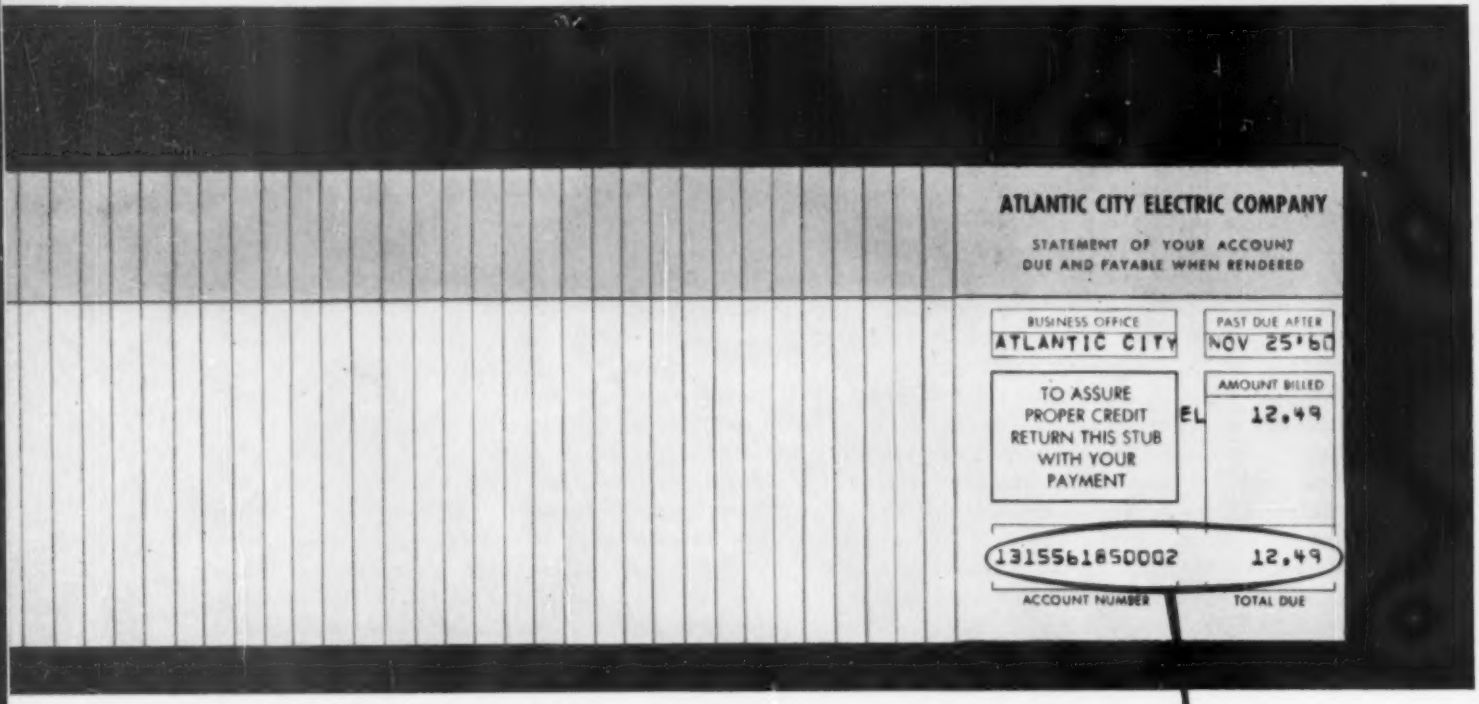
The railroad president later informed Caywood-Schiller that he had leaned toward abandonment. Even without benefit of an OR study, he would have made the "right" decision, but OR eliminated all doubts by spelling out in detail the effects of the alternative courses of action. It also showed the opposing factions that the final decision was not arbitrary or capricious but based on a scientifically developed study.

Significantly, this study also resulted in some unforeseen and unexpected benefits to the railroad. In researching the various facets of the route's operations, it was found that certain cargoes that were being shipped over the route could be re-routed cheaper and faster. The use of Operations Research, therefore, helped management eliminate a money-losing operation and also pointed the way to change that would cut costs.

There are, of course, business problems without clear-cut alternative answers. There may be a large number of possible decisions and sub-decisions necessary. For example, a company is manufacturing a homogeneous product such as tires, or cigarettes, cereal, mattresses or pillows, and management wishes to expand production capacity. Should one or more plants be enlarged? Which one, and how much? Should a new plant be built instead, and where? How big should it be, and how much production capacity should it have?

Continued on Page 21





Farrington Optical Scanners on the Job

UTILITY COMPANY CUTS COSTS WITH MACHINE THAT READS DATA FROM CUSTOMERS' BILL STUBS

When you send in your electric bill with payment, a machine may be waiting to read it and to translate what it says into computer language. Atlantic City Electric Company already uses a Farrington Optical Scanner for this purpose.

Here's how it works: bill stubs are run through the Scanner (also known as the EYE) at the rate of 240 a minute. The Scanner reads each account number and the amount paid. It instantly converts this "people language" into "machine language" (computer tape, punched cards or magnetic tape).

By eliminating time-consuming and laborious manual punching, the Farrington Scanner makes possible such high-speed, high-accuracy cash accounting systems. You'll find it also being used for Insurance Premium Cash Accounting and for Subscription Promotion Entry.

The versatility of Optical Scanning permits almost unlimited applications. You can build an entirely new system around it. Or, if your present system uses three or more operators who read and punch, chances are that you can profitably use an Optical Scanner right now. Only Farrington has the experience to go with it.

For further information, write Farrington Electronics Inc., Needham Heights 94, Massachusetts

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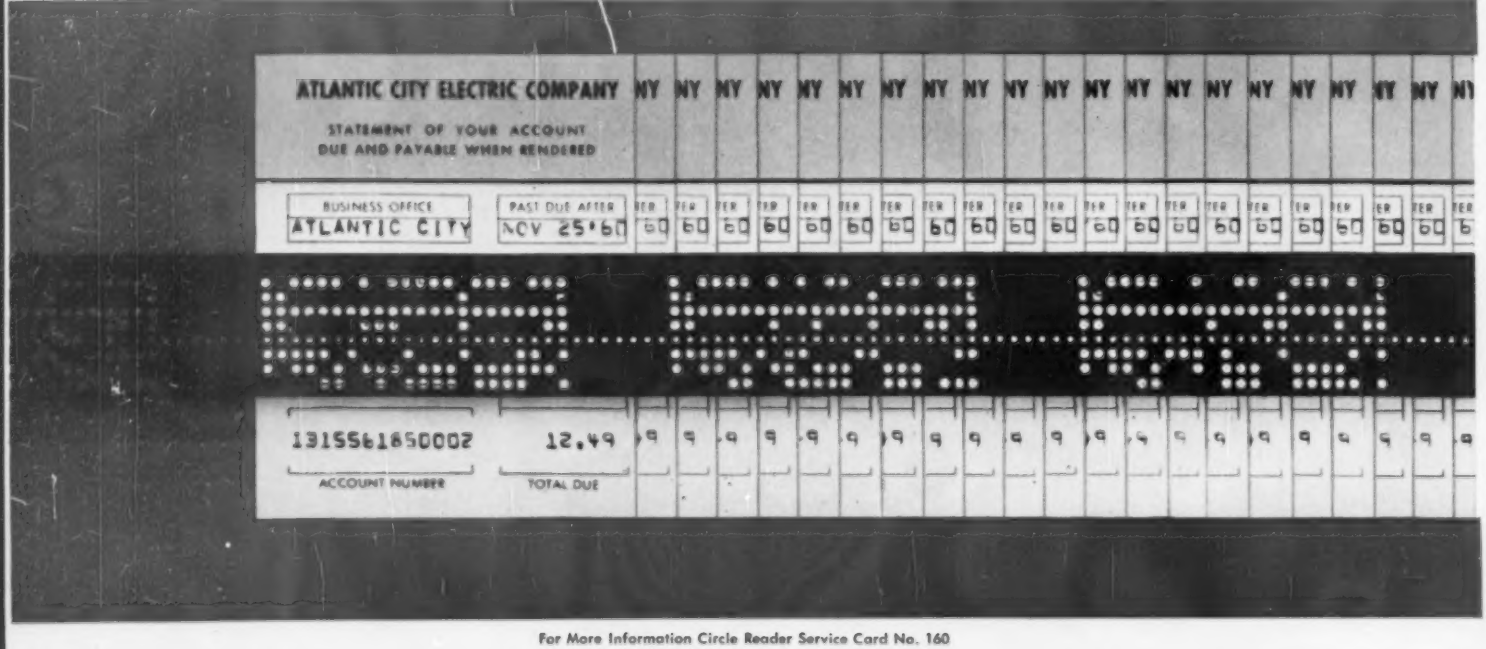


Three senior analysts at Caywood-Schiller, Robert A. Sebastian, James T. Morse and Edgar M. Jacobs, check a program designed to simulate the operations of a manufacturing plant on a G-15 computer.

How many employes will be necessary? It must be taken into account that each of the existing plants has a different production capacity and per unit cost, which means that a decision on allocation of production to a new plant will have to serve the needs of the consumer at the least overall cost.

Chowder Society picnic

Before OR, management was hard pressed for the right answers. Such a problem involves possible thousands of variable factors and hundreds of possible alternatives. With so many alternatives, making a large number of correct decisions is a monumental task. Even one wrong decision in 10 could be extremely costly. Without OR it would be impractical, if not impossible, for a company to explore all possible alternatives, and no non-OR company has personnel with the special training required to do such a complete research job.

A simplified example of such a problem—involving a number of variables—can be drawn from the fifth annual picnic of the Little Men's Marching and Chowder Society. As chairman, you must operate within an $800 budget for food, drink and prizes. Last year, total attendance was 150 adults and 327 children. The year before, there were 200 adults and 293 children. Two years ago there wasn't enough hamburger and chicken, but there too many hot dogs left over. Last year hot dogs and hamburgers ran short but there was an excess of chicken. Then someone remembered that the chicken was too salty last year, and that was why little was eaten.

In addition to ordering the type and quantity of food, a decision must be made as to how much beer and how many bottles of what type of soft drinks should be stocked—not to forget the prizes. Assuming there are 10 items in all to be ordered,

Continued on Page 44

Solution

(to problem on page 19)

The proper animal feed mix supplied by Operations Research techniques is: Corn—11.3%; Wheat—42.9%; Barley—13.2%, and Alfalfa—32.5%. The cost per bushel for the mix is $1.44.

Top management of American Bosch Arma Corp., left to right Clifford A. Sharpe, senior vice president, and V. Charles Schorlemmer, vice president of finance, worked closely with John Field, vice president of Omega Management, Inc., standing, to develop the Continuous Flow Modular Accounting system.

New Accounting Concept Based On 'Assembly-line' Processing

AN ACCOUNTING system which breaks from the conventional batching method and, in fact, returns to the much older idea of posting transactions as they occur, has become a key function in the "total systems" program now in effect at the American Bosch Division of American Bosch Arma Corp.

Instead of handling accounting as a job-shop operation, which is done in a large majority of businesses today, management decided in favor of a continuous flow operation—processing data in assembly-line fashion. This Continuous Flow Modular Accounting (CFMA) system, first considered as an "odd-ball" idea because it ran contrary to common practices, is proving highly successful.

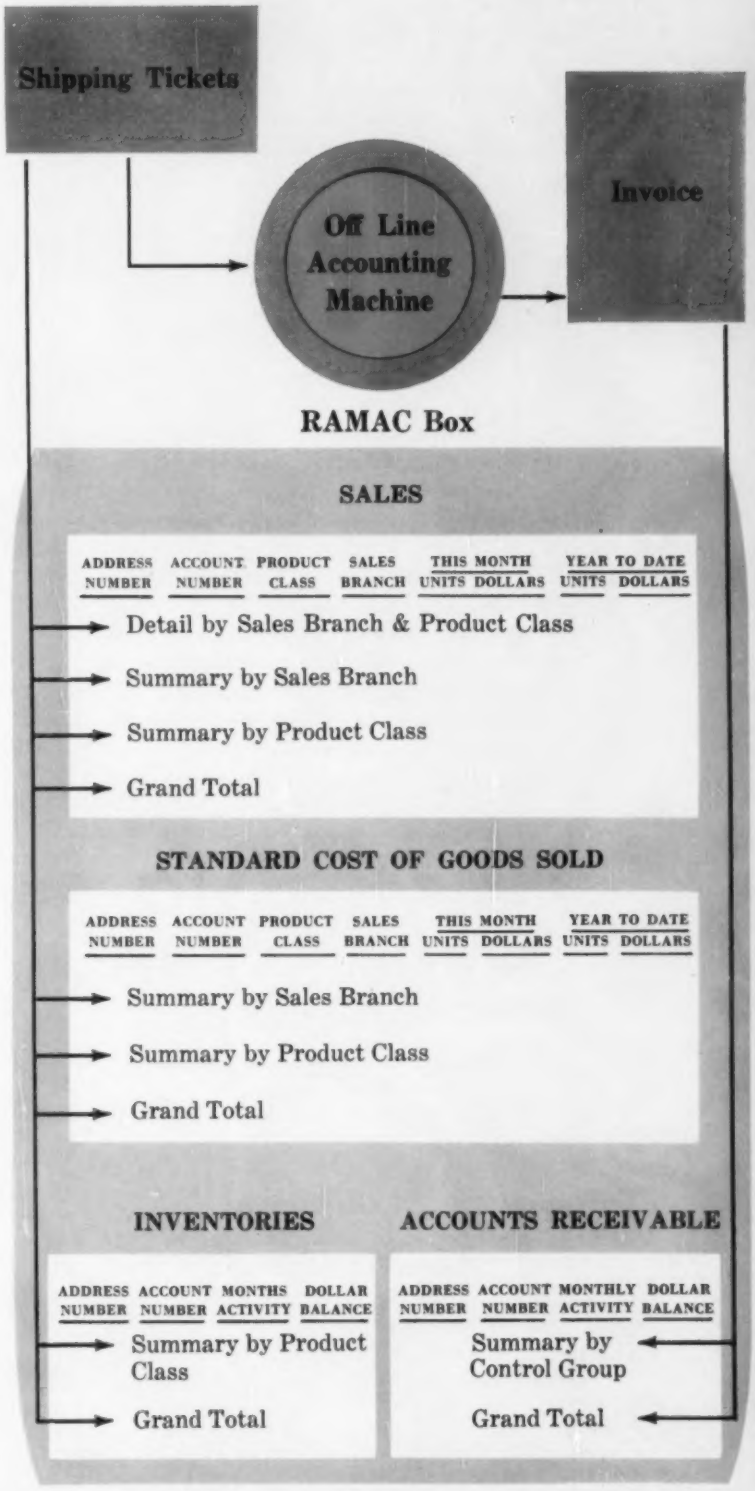
Conceived by a group of consultants headed by John Field, the basic method was in part suggested by qualities attributed to the Random Access Method of Accounting (RAMAC) introduced with the IBM 305 computer system. In general practice, full use of the concept had been retarded by programming and auditing obstacles, but the breakthrough came at American Bosch when uniform data was provided through a modular approach.

Basic line-items of information were constructed into accounting terms and formed into modules of information for storage in the memory of the computer. This modular approach defines the job to be done in its simplest common denominator, the standard line-item, and it provides a very flexible basic system which can be operated by a wide range of equipment. Because of careful programming, any of the information modules can be updated in a matter of seconds, keeping the accounts on an up-to-the-minute basis. A trial balance can be run at any time (presently on a daily schedule), and current reports are available literally at the touch of a button.

Chart I

Continuous Flow Modular Accounting

Continuous Flow Posting—Shipping Ticket and Invoice



In this example of Continuous Flow Posting, information from a shipping ticket is fed into the computer and affects four stored modules covering sales, three covering standard cost of goods sold and two covering inventories. Sales modules updated are: sales activity of a branch for a specified product class, total sales activity of the branch, sales activity of the product class and total sales activity of the division. Cost-of-Goods-Sold modules affected are: standard cost-of-goods-sold in a sales branch, standard cost of given product line, and total cost-of-goods-sold. Inventory modules affected include: product class inventory balance and total inventory balance.

At the same time, an invoice, prepared by an off-line accounting machine, updates two modules of information stored as accounts receivable. This updates the accounts by control group and the grand total.

John Field and his task force of consultants was given the job of preparing a total systems plan for American Bosch. Working closely with top management as well as supervisory personnel, Field and his staff prepared a plan that was sufficiently detailed for specialists in the various parts of the company, yet broad enough to be readily understood and approved by top management. Well informed technicians and managers who accomplished the actual installation were active in designing and editing the work.

A legion of reports

In developing the accounting portion of the total system, the task force was faced with a problem common in American industry today, that of "creeping overhead." This term describes what happens when a company gets infected with the "automation bug" and installs a computer—allowing for extra capacity to take care of expected growth. The emphasis is often on hardware—"hardware hypnosis" as it was described by John Beckett in "The Government Evaluates Its Data Processing Progress" (Sept. '60 issue)—and it brings about a side effect. The work available quickly expands until the full capacity of the computer is used.

Inspired by the fascinating speeds and mathematical wizardry of the computer, everyone begins thinking of ways to generate information. New departmental subdivisions are formed for allocating expenses. A dozen added methods for classifying work spring up. A legion of reports are born, and paper work grows and grows while the additional information produces confusion rather than control. To make matters worse, those who generate reports are reluctant to give them up when they become obsolete, "just in case" they

may be needed sometime. These are the "JIC" reports that exist for no reason.

To avoid this waste and confusion, the task force first adopted a set of four major ground rules for the accounting system: (1) Only information necessary for planning and operating the business would be gathered; (2) Forecasts, schedules, budgets and orders would be prepared in standard accounting form so that reports of operations could be readily reconciled with plans; (3) Reports would be restricted to the kind of information set forth in planning and ordering documents, and (4) The reports would be compared with planning, providing a closed loop of planning, action, reporting and replanning.

Pro forma planning

The ground rules were invaluable in providing a means of curbing the inevitable tendency to keep adding information to a system and in keeping a tie-in between planning and reporting to continually improve both.

The first step in design was to define planning information required for running the division. This consisted of nine major items: (1) sales forecasts and loadings; (2) branch inventory and factory shipment schedules; (3) manufacturing inventory and production schedules; (4) capital expenditure budgets; (5) manpower budgets; (6) departmental expense budgets; (7) forecast profit and loss statements; (8) pro forma balance sheets, and (9) cash flow plans.

next month . . .

Raytheon's Unimarket

A New Distribution Concept:

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And . . . A Director of

Intelligence Services

for Business?

By Marion Harper, Jr.

Office Printing Method Pays Its Own Way at Gerbers Baby Food Plant

Once planning was defined in detail, it was found that several hundred reports could be eliminated, many accounts combined; and in a few instances accounts were added. The net results were manifested in a new chart of accounts that was better balanced and very much simplified.

Organizing the line-items into information modules was the next step in the plan. Each planning document and report, for example, consisted of a specific number of items constructed in accounting terms. Some of the items referred to activities such as sales and production, other to balances for inventory-on-hand or backlog. All of the line-items were compatible in as much as planning items conformed with reporting items in content, timing format and summary groupings. Likewise, activity line-items tied in with balance line-items, so that all inter-related lines of information could be compared and balanced with one another. Finally, all of the items were designed to be handled by automated business equipment.

Altogether it requires about 180,000 information modules to control the American Bosch plant. Of these, more than half are needed for production and inventory control and the remainder make up accounting and allied controls. Out of these can be constructed planning for operations, all reports ranging from performance of individuals to financial statements of the division and other necessary documents such as bills, payrolls and remittances.

"Trigger decks" fire reports

In mechanizing the CFM accounting, the company chose to use the IBM Ramac 305, primarily because it had the only high speed random access memory at the time the installation was planned, and its capacity suited the needs of American Bosch. Other equipment can now be adopted to modular accounting.

Each module of information is stored only once in the computer memory. When transactions occur, new information is fed into the computer to update activity summaries and balances. Each insertion is posted to the stored module it affects.

Information on a shipping ticket (See Chart I) updates nine modules in a few seconds covering sales, costs and inventory. The invoice is prepared off-line, and it, in turn, provides information to update two modules in accounts receivable. In addition to shipping tickets, line-items are posted from work tickets and time cards to internally stored employe earnings records. Purchase items, cash receipts, and in fact all source documents, are posted in the same manner.

Reports are prepared on demand by means of "trigger decks" of punched cards. Each report consists of a given number of modules, so it can

Continued on Page 26

Unitray System speeds card handling at Montgomery Ward

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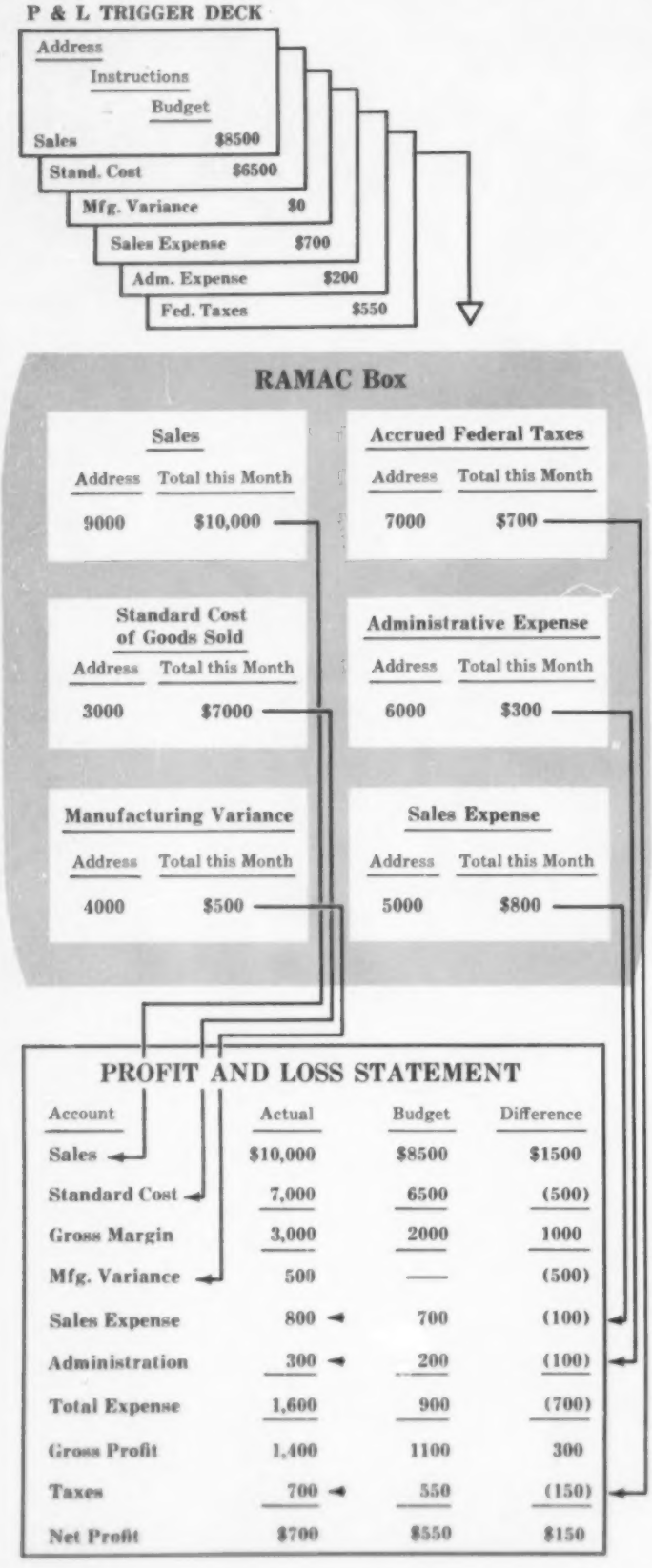
Chart II

Continuous Flow Modular Accounting

Continuous Flow Reporting—Profit and Loss Statement



Reports, under CFMA, consist of a given combination of internally stored modules, and they can be prepared by using "trigger" decks which refer to the appropriate modules. In this simplified example, a profit and loss statement would be pulled by triggering addresses 9,000; 3,000; 4,000; 5,000; 6,000; 7,000. Information on sales, cost of goods sold, manufacturing variances, taxes, administrative expense and sales expense is immediately accessible. Budget information is added by means of the trigger decks and during the print-out cycle, performance is compared with budget figures and the difference between the two is calculated and printed out along with the actual and budget figures.

CFMA *Continued from Page 24*

be made up from punched cards which reflect each module. For example (See Chart II), a profit and loss statement can be pulled by triggering a deck holding six information modules. This is a highly simplified example, but it expresses the way in which payroll, regular reports or any kind of special report within the module range of the system can be prepared at the rate of over 100 lines per minute. Management can have a trial profit and loss statement at the end of each day if it desires.

Balancing difficulties

An unusual feature of the system is that the budget information, which changes from period to period, is entered by means of the trigger decks. This information is punched into the cards prior to reporting periods and can be readily changed as the budget changes. While the appropriate line is being sought by the computer in the reporting cycle, the budget information in the trigger card is being stored.

During the print-out cycle, performance is compared with budget, the difference between the two is calculated, and all three sets of figures presented together.

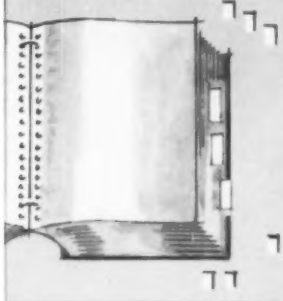
One of the chief advantages of CFM accounting stems from the very point that many would call an economic limitation—the posting of individual transactions as they arrive. Careful programming is credited with overcoming this economy-of-operation factor. Through the proper arrangement of internally stored data, operations are overlapped so that, in combination with the high arithmetic speeds natural to all computers, nearly a dozen postings can be made in less than two seconds. Most important, the daily posting elim-

Continued on Page 34

INDEXING

EY TO FAST, EFFICIENT RETRIEVAL OF PRE-FILED DATA

ECIAL INDEXING PRODUCTS FOR DATA PROCESSING



Indexes for Continuous Forms. For indexing continuous forms after they are printed with data from punched cards. Control-punched to fit in thin post binders. With insertable tabs, and typewriter- or machine-spaced inserts.

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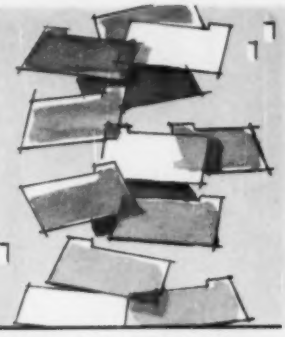

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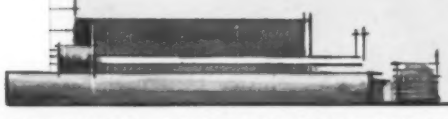
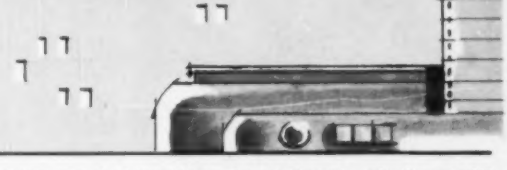
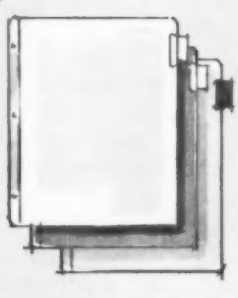


Machine-punched inserts in continuous strip form. Punched holes on edge guide the insert strip through high-speed machines that automatically print titles from punched cards.

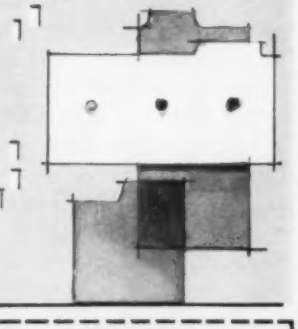


INDEXES AND GUIDES WITH TYPEWRITER AND MACHINE SPACED INSERTS

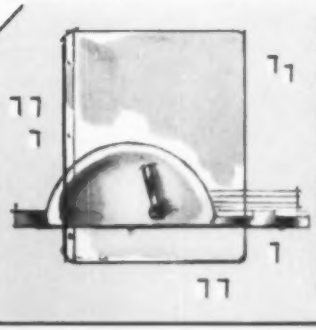


Insertable indexes for ring books. Index tabs are specially-made for typewriter- and machine-spaced inserts.

Insertable guides for filing punched cards and other data. Vertical or horizontal styles to match various types of punched cards. Typewriter-spaced inserts also in continuous strips, punched for machine feeding.



REINFORCED SHEETS



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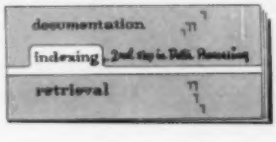

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Round Table—Part 2

Effects of Business Automation In the Sixties

Discussing: Total systems, management by exception, simulation, problems of middle management, future of "paperless" systems.

IN PART ONE of this presentation (January issue, page 18), the experts predicted, among other things, a "moneyless" economy made possible by a universal credit card system, which would effect new methods of pay, purchasing and taxation. The computer's role in projecting the future results of "today's" management decisions was considered a certainty in the present decade. The panel also challenged the myths of job displacement, pointing out that there are only a few negligible examples of unemployment directly caused by business automation.

This is the second in the two part series reporting the round-table discussion, "The Effects of Business Automation in the Sixties," conducted by Management and BUSINESS AUTOMATION magazine at the recent Business Equipment Exposition, held at the Los Angeles Sports Arena. The exposition was sponsored by the Office Equipment Manufacturers' Institute.

MODERATOR: If the cutting of clerical costs and replacement of personnel are not the principal roles of business automation, then management must obviously have other reasons for moving so rapidly in this direction. We hear quite a bit about "total systems" and "management by exception," but for the most part these seem to have become management cliches rather than management principals.

We still have the "islands of automation," with data processing operating under the accounting or financial departments, practically isolated from other areas of the corporation. Personally, it seems to me that we have a much greater need for "integrated management" than we do for integrated data processing. For without complete coordination, and cooperation, on the management level, the latter is an impossibility. Do you gentlemen see an hopeful signs along this line? We'll start with Gordon Smith.

MR. SMITH: Well, we think very definitely there is, but speaking from our standpoint as a manufacturer and supplier, we find it is almost impossible to educate management in reorganization necessary to accomplish "total systems." It is here that we feel consultants should play their major role.

I cite an example where, with available equipment, we could do a total integrated system for a large pharmaceutical manufacturer who has some 23 warehouses around the country. At the present time, it takes 14 days from the time the shipment

Panel left to right: Gordon Smith, Univac; Neal Dean, Booz, Allen & Hamilton; Albert Wike, Addressograph-Multigraph; Arnold Keller, moderator; Phil Hyde, A. B. Dick Co.; William Simmons, IBM; George Ryan, Friden

is made at a warehouse until it is reflected in the records at the home office. There are departments, managers and all kinds of organizational levels which are trying to cut this time.

There is equipment which would eliminate this 14-day lag. The presentation was made; the costs were assessed. But one could really evaluate what this would do to the business in terms of making it more competitive. The real problem was that organizationally, at the very top of the business, they were not prepared to make changes required to control an integrated systems design.

Throw baby out with bath water

I find increasing interest in the new post of administrative vice president which we read about these days. Such a person controls all data processing within an organization, and reports directly to the president.

MR. DEAN: I agree, Gordon, that the true source of the problem is in the organization orientation. Remember, we are dealing with human beings, and they are all defensive about their own little empires. Perhaps management consultants contributed to this by their emphasis on decentralization of profit responsibilities. Now, none of us want to throw out the baby with the bath water. We want to see decentralization of profit responsibility, but what we have to do is enlighten these decentralized managers—and this is a person-by-person, company-by-company type of problem—so that they recognize that they don't have to control every aspect of their operation, including the mundane data processing, in order to take this responsibility.

They certainly wouldn't question working from a common transformer for the lights in their office.

Ultimately, they will look at their data processing as a utility type function which can be performed centrally. Now, is it a top management function? Is an "administrative vice president" the answer? I think this depends upon the company and the type of business involved.

We recommended recently that a large insurance company bring in a vice president of information processing just to tie the whole information problem of the company under one head. He reports directly to the president, which, we think, in many cases is essential. There is, of course the built-in relationships of the controllers and the finance functions.

MR. WIKE: "Business simulation is a bit nebulous, unless management really has a true understanding of what it wants to accomplish. Unless they intelligently use the computer, the answers may not be significant."

MR. HYDE: "Advertising and promotion in our field will grow substantially in hard copy products. We figure that if we are going to be put out of the business of making copies in the systems field, we might as well do it ourselves."

MR. SMITH: "Manufacturers and suppliers find it almost impossible to educate management in reorganization necessary to 'total systems,' and it is here that we feel consultants should play their major role."

In the past, I think we have to grant that they have been too financially-oriented to accounting to do the total job, and that as a result, the manufacturing area hasn't received its proper attention. So I think that there is going to be an evolution, and I think we can play a role in it, and we are certainly prepared and enthusiastic about doing it.

MR. SIMMONS: I would like to say one word about this total systems concept and how it is working out. At UCLA, in the Western Data Processing Center, which is the only pure business research data processing center, Dr. Sprowls is running a very interesting job with the 7090. He is simulating a manufacturing company which will ultimately be a total systems simulation. But, the interesting thing is that he is doing it in separate operations, handling each operation of the company individually, and then hooking them together.

For the very reason that has just been mentioned, it's a tremendous job. And the payoff may well come from each section. By payoff, I do not mean displacement; I mean a better operation, more for the same, not the same for less. This is the key.

MODERATOR: The word "simulation" and the process it describes seems destined to become an important part of the business automation scene. I wonder, Mr. Simmons, if you could give us a short definition of the term so that we might all

MR. DEAN: "Much of middle management today is making routine decisions and making them poorly and inconsistently — machines should be making them. They follow better than humans.

MR. RYAN: "You can't cut clerical costs without affecting jobs. One follows the other. When we are talking about computers or machines replacing clerical functions, we are talking about replacing people."

MR. SIMMONS: "One of the things about simulation is that the things no one trained in normal middle management would have had the understanding to try, now become profitable.

be in agreement as to what the word means.

MR. SIMMONS: Well, I think I will repeat what I said in my opening statement. I believe it's rather short and to the point. It's the word art—and I would like to stress "the art," this is where people come into it—the art of putting a model of a business in the computer and then feeding hypothetical questions—again, people feeding questions—to the model to anticipate situations long before they occur. This is simulation . . . creating a model of a business so you can try plans for tomorrow on the model today. Then you can make use of the optimum plan, thus making "tomorrow" better than today.

Education before simulation

MR. SMITH: I think that you have a lot of practical simulation examples in the missile field, where you build a mathematical model of a missile flying through space and then adjust this model based on hypothetical possibilities. You can literally fly a missile without ever building it and determine exactly what the conditions are going to be if certain things develop. This has been brought down to much more mundane things as the design of cams, for example, in mechanical devices.

The automobile industry is very aggressively pursuing the possibility of simulating an automobile on a computer. It could answer the question of where to put the engine—in the rear or the front, or where? And, what effect will this have?

In regard to educating management to use this; a number of us in the industry have been using the management games, which are simulating a hypothetical industry situation. We find we can take a man who is marketing-oriented and make him the president of a mythical company for a period of one or two days, and he starts to comprehend the entire relationship of his decisions with those of his opposite numbers in other areas. This is the sort of education process which is going to help a great deal.

MR. SIMMONS: To add to this game field, we have gone to the extent of actually simulating things like portfolio analysis in the banking field. We are taking a specific job and literally simulating the specific bank operation and letting the bank people play it. Several banks are now using this as management training for their own people.

MR. WIKE: Engineering or scientific simulation resolves itself down to the ability of a computer to perform known, required calculations at extremely rapid rates of speed, and to arrive at decisions faster because of this speed. The problems that are put in or the questions that are posed, if you want to put it that way, are pretty finite. Business simulation, on the other hand, be-

comes a little bit more nebulous unless the management of the business really has a true understanding of what they want to accomplish. Unless they intelligently use the computing machinery, the answers that ultimately come out may not necessarily be significant. This is the real difference, and I think it's something that has to be considered, as a part of the problem of management education.

Payoff in sausage

MR. SMITH: I think we educate best by example. We have some very acute problems today which are being solved in aviation air traffic control—which is a must—so that time and money and all of the organizational problems are put aside in order to solve them. We find there is an increasing number of men in business today who are facing up to a tough competitive data processing problem and are very much interested in commercially developing the things that we have all answered for the military. Within the coming two years, we foresee three or four major data processing simulation systems concept breakthroughs in individual industries. And once, let us say, General Motors cuts the time lag on their inventory between plants, the rest of the automobile industry will be forced to do the necessary things. The education there comes from the necessity to follow a successful example.

MR. DEAN: Simulation as a concept is easy to comprehend, but the difficulty is in developing the quantitative relationships that exist between these various functions of business. Now, if you try to intrigue top management of most of our businesses with "scientific management" as a concept, it will be relegated to a research director down the line and we will get very little attention.

But, if we can build this into management's data processing system in the terms of a total information system concept—in other words, determine what these relationships and functions are, in order to build up the data processing system—then it is relatively easy to proceed from there into the future and simulation.

We have to approach this on a job-by-job level. The young fellows in our management training programs will not know enough about practical business in order to take this over. They are going to have to work with the practical business people. The management games have proved very effective as training tools, but they will be worthless as far as simulation is concerned because they have so oversimplified the problem that the results are trivial.

MR. SIMMONS: I think a very important point goes back to George Ryan's comments that every

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proposal has to show a payoff in displacement. We have an interesting example in the sausage blending industry where there isn't any payoff in displaced persons who formerly figured out how to make sausage; there aren't that many people involved in the operation. But putting in data processing machine—it may be used only a few hours a day—the profit in the sausage blending goes up more than it pays for the operation. This is the sort of thing that is educating management. I think you do it by proposing properly and by teaching them what they are going to get.

Unfortunate "intangibles"

MR. RYAN: I don't think that the points are identical. My point is that you can't cut clerical costs without affecting jobs. One follows the other. Certainly, mixing sausage more economically doesn't affect clerical jobs. My point here was strictly that when we are talking about computers or machines replacing clerical functions, we are talking about replacing people.

MR. DEAN: I think one of the reasons that we have had so much trouble selling the nonclerical displacement advantages of computers is that we latched the unfortunate term "intangible" onto it. And, if there is anything that doesn't interest a board of directors, it's the intangible results.

In one example, we were confronted with a situation where we were convinced that the only way to solve the production control and inventory control for a large job shop operation was to have a computer. We worked up a system and projected a complement of equipment which was going to increase their data processing cost about a quarter of a million dollars a year. We couldn't sell it just on the basis of future improvements. So, we finally convinced the division manager, who had to make the decision, that he should let us install a pilot punched card system on only 10 percent of his division—and then see what the results were. We did that for six months, and we reduced the work in process inventory by such a radical amount, and we increased the labor product so greatly that we had to cut it by three before anybody would believe it. We came up with a million dollars a year savings in these two areas, and we sold the entire system.

MODERATOR: Much of the discussion so far has indicated a "paperless" future. Mr. Hyde, Mr. Wike and Mr. Ryan represent a segment of the business automation industry whose future, it seems to me, is tied rather closely to the use of paperwork in business systems. In addition, I think we can all agree that the thousands of small

Continued on Page 38

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 Continued from Page 26

inates the peak load problem at the end of accounting periods and allows for unusually high machine and employe utilization. This compares more than favorably with many batch systems which look good on paper but fare very poorly when idle time between peak periods is taken into account.

Accountants might point out the balancing difficulties usually present in an up-dating daily system, but the answer here is a large number of built-in safeguards. One important factor is the running of trial balances of control accounts daily, which takes only a small amount of time. It appears to be more accurate, from an auditing point of view, than most conventional methods.

Time for another step

Worth repeating is the fact that the system can provide current reports on demand, eliminating the former three-week delay in receiving operating statements. CFMA is also a highly flexible system which can be changed easily. Its hardware can be modified without severe difficulty, and, unlike many systems, it took months rather than years to install.

The decision to modernize control systems at American Bosch came directly from company president Charles Perelle, recognized in his own field as a leader in developing manufacturing techniques. He was aware that new systems and business equipment were becoming available, which could bring about effective changes in control areas. It was not a matter of starting from scratch, for the company had been progressively making changes throughout the past years (American Bosch was among the first firms to install an early Univac computing system). It was more a decision on his part that the time had come for another step forward.

Six years ago the company began an extensive modernization program of manufacturing and product distribution facilities, at a cost of over $5 million. The effect of the program was felt throughout the organization, and in Mr. Perelle's words: "We felt it was necessary to have a data processing system sensitive enough and fast enough to react to our modern factory and distributing facilities. We needed management reports as soon as possible to ensure that we were getting the best return on our new facilities and that we are offering our customers the best possible service."

After five months of preparation on the part of company personnel, the first part of the plan—covering production and inventory control—was composed by Field and his staff.

The close tie-in

Installation began in July, 1959, and by February, 1960, American Bosch had the new production control system in operation. This system received public recognition when International Business Machines Corp. used it as an example of its new M. O. S. (Management Operating Systems) program.

The second part of the over-all plan, covering finance and accounting, was completed and approved by January 1, 1960. Installation has taken a year to facilitate every possible contingency and provide ample time for corrective changes.

Results to date confirm an original estimate that the production control system would save $300,000 yearly. It has already provided savings in excess of $150,000.

Although the CFMA plan has just been accomplished, the close tie-in between planning and reporting assures progressive improvement of both with better operations as a result. At American Bosch, a 20 percent reduction in accounting manpower is anticipated with only a nominal increase in equipment cost. Progress to date supports this estimate. ■

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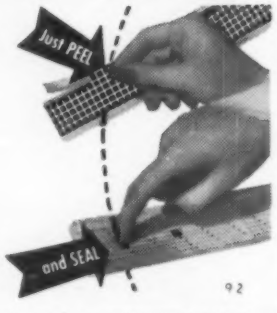

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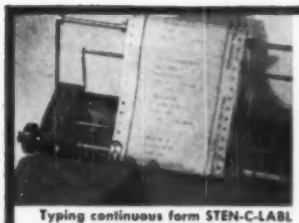
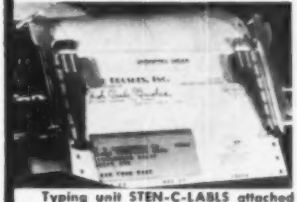

Typing continuous form STEN-C-LABL on electric typewriter.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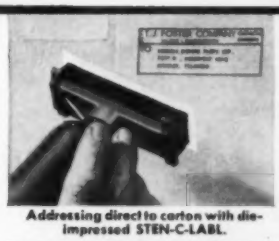
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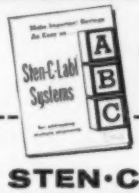

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News Feature

New Equipment, Advanced Ideas Highlight EJCC

Exhibits, crowded on several floors of the Hotel New Yorker, attracted excellent attendance because of many new equipment introductions.

NEW YORK CITY's biggest snow storm in 10 years cut into attendance at the Eastern Joint Computer Conference and exhibit in December, but it didn't stop the flow of information or the exhibits of new equipment which attracted some 2,000 hardy registrants.

There were 28 papers presented during the two-day program in the large Manhattan Center. Most of the subjects covered advances in electronic data processing equipment, with a few dedicated to advanced ideas. One of the latter was a paper called "A Method of Voice Communication with a Digital Computer," presented by S. R. Petrick and H. M. Willett of the Air Force Cambridge Research Laboratories. They explained experimental work in a pattern recognition procedure for achieving automation recognition of spoken words by a medium scale computer.

Charles R. Langmuir of the Physchological Corp. led off the sessions with a discussion of "A Logical Machine for Measuring Problem Solving Ability." He described a small, desk-top device which is useful in evaluating candidates for electronic data processing assignments. It measures an individual's problem-solving ability.

Another paper, "High Speed Data Transmission Systems" by R. G. Matteson, Stromberg-Carlson Co., described his company's equipment for the transmission of digital information over standard telephone lines at 2,400 bits per second. T. F. Kavanagh of General Electric Co. introduced the TABSOL (Tabular Systems-Oriented Language) concept, an automatic programming technique for solving structure tables on any computer. He prefaced his paper with an explanation of the use of Decision Structure Tables which can be used to describe complex, sequential, multi-variable, multi-result decision systems.

Gomer H. Redmond and Dennis E. Mulvihill, both of Chrysler Corp., presented a case history of the rare use of a binary computer system for data processing.

Some of the equipment unveiled at the EJCC exhibit at the New Yorker Hotel included the Packard Bell battery-operated computer. Using the new PB 250, the company demonstrated a power supply that would keep the computer running for more than an hour. Autonetics Div. of North American Aviation, Inc. introduced its Recomp III solid state digital computer, and Philco Corp. showed its Model 212 (See Product Preview, page 48) general purpose computer.

Ramo-Wooldridge Div. displayed its new "stored logic" computer, the AN/UYK-1, and the Uptime Corp. exhibited the Speedwriter 2000, a card reader which can read at speeds ranging from 400 to 3,000 words per minute.

An interesting unit shown for the first time was a computer-operated teaching system designed by the Systems Development Corp. It utilizes a Bendix G-15 computer system for student training. The student communicates with the system through a keyboard and the computer communicates with a display unit. The computer can, through programming, vary its instructions according to the ability of the student.

All in all, some 65 exhibitors showed equipment at the meeting. ■

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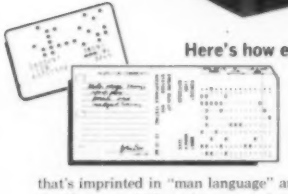

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Round Table

Continued from Page 33

business operations, who are today beyond the scope of computers and magnetic tape records, must still rely on paperwork. What is the future for paper in electronic data processing?

MR. HYDE: There are several types of paperwork in the concept of the duplicating machine manufacturer. There are forms, bulletins and promotional materials that will continue to grow in volume. To determine the main reason for this continued growth — other than in the systems field—we have to look over a 70-year period to find a trend toward the marketing emphasis.

Way back in the 1800's, 33 percent of the people working were farmers. Seventy years later, this consists of only 20 percent. If we look at the group of managers, salaried personnel, sales people and office workers, we find a growth of from six percent to 25 percent over the same 70-year period. Wage workers, on the other hand, went from 61 percent down to 55 percent up to the beginning of World War II. So it shows a marked trend, which hasn't changed in direction.

Education is visual

If productivity is better in a wage worker sense, then the emphasis will have to be on distribution as this displacement occurs over the next 10, 15 or 25 years. And to do that, the advertising and promotional materials in our field will continue to grow substantially in hard copy products, black and white and color. Now, we figure that if we are going to be put out of the business of making copies in the systems field, then we might as well do it ourselves. And, we have proceeded to do it with new developments within our own company.

Mr. Wike, our worthy competitor, is doing the same thing. If we are going to go out of the hard copy systems business, it will take a while, I think. The reason it will take a while is partly sociological and partly basic education.

The example we might give here is that in schools, from the time a child starts in the first grade, much of his education is visual—written word, books, something thrown on a screen—but it's visual. Then we get into the fact that all through his school career he learns visually, and suddenly we expect him to depend upon a machine to give him the answer in certain fields—or literally make himself more automatic. This is the drag that occurs when you go into top management with your total concept. Before the war, we had a great many people who, in the executive class of management or owner, made intuitive decisions. Now, you are talking about more scientific management that doesn't need quite as much intuition, since they can depend upon calculations that can be performed to predict what is going to happen in business. But, again, we run into this drag of a whole life of education based on looking at something.

This has saved the bacon, obviously, for quite a few years—and for a little while to come—at least in the systems field. We recognize this, and we have looked at it and we are part of it. We think we have some pretty good answers coming up, without mentioning hardware.

MR. WIKE: I would like to add a few comments to those of Mr. Hyde. It has been our experience that automation, particularly with computers, has resulted in an increase in the requirement for the paper document rather than a decrease. For example, reports that formerly were obtained once a month are now released once a day. The management group, by and large, hasn't quite reached the point where their faith in electronics is such that they are willing to eliminate the paper documents they like to look at from time to time to make sure that what the machine says is right.

Leave no tracks

Take, as an example, the stockholder and trust record keeping activities in banks—where the complete record keeping system is handled on magnetic tape. We find that ledger cards are still required be-

Continued on Page 40

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cause somebody wants to look at them. The ledger card theoretically hasn't added anything to the system except a certain sense of security. There are periodic requests for printout that did not exist before because under the old system the master file record was readily readable. Now, the master record is no longer readable, so somebody wants a printed document reflecting the condition of the document.

All these things, rather than reducing the requirement for paper documents, have tended to increase the requirement. I feel, of course, that this shouldn't be; but I have seen really no significant trend toward elimination of paper records.

MR. RYAN: We had an interesting experience, and I am sure it can be paralleled by the IBM people, with data collection equipment that leaves no tracks; it leaves no printed record. The educational problem here is a tremendous one. People have been trained to want a piece of paper that they can look at and say, "Yes, I have clocked in," or "I have not clocked in," or "I have started this job," or, "I have not started this job."

Some rather trivial steps

Each time we talk to prospective buyers of this equipment, the request is for a printed record. It doesn't add anything to the system, but it gives them a sense of security. They have very little confidence, actually, in any system that doesn't leave a printed record.

MR. DEAN: Well, it is a sociological evolution which I think is going to take some time. It is going to take a deliberate orientation on management's part to do something about it. There is no earthly reason in many cases for these detailed ledgers, as in the case of credit authorization. What they need is an exception report. What it takes is an aggressive management say, "You won't have them."

Now, as far as the populace relying on hard copy paper—we have already seen some rather trivial first steps, if you will, in that regard, but they have worked well. Many people were concerned about giving up the detailed statement in banks—the list of each and every check that was written and every deposit that was made.

Of course, actually this was an advance over what they had some time ago, and still have in England, where they type out the name of the payee of each check. But a great many banks have come to use the short statement which just shows a total column. They worried about what people would do without this list of checks. Well, I would like to point out, and I think this is universally true throughout the nation, that it is a very workable system and people really like it.

Tomorrow they pay

Though New York City has been very slow to adopt it because of its early negative experience, elsewhere throughout the country, they are rapidly moving toward it. Some bankers suspect that people never look at their statements anyway, and I wonder how many people really look at this hard copy that they keep feeding them.

MR. WIKE: I think the example is not quite fair. Short statements within the banking business and also in department stores and petroleum companies are fine and acceptable as long as the originally authenticated document accompanies this statement in the form of the checks, purchase slips or sales slips that the buyer has signed. But what happens when we no longer have these documents either?

MR. DEAN: Then you would have to have a coded list.

MR. HYDE: One thing we must be very careful to guard against—if we do away with hard copies—is keeping men in the second level of management from learning to make decisions.

MR. DEAN: I think the thing is that much of our middle management today are making routine decisions and making them poorly and inconsistently — and machines should be making them. Take the branch managers of banks. They are middle men who decide to pay a certain draft. Well, if they are not feeling well today, they decide not to pay it; tomorrow they pay.

When this is pointed out to top management of the bank they get upset about the inconsistent philosophy. Of course, a machine can follow much better than any human individual can.

Now, as far as training for a top management position, I think that sort of training is bad. If that branch manager spent all of his time learning to make a good loan, he would make a much better president of that bank.

MODERATOR: Now we bring up another problem. We have agreed that the clerical work is saved, but certainly it seems to me that we have just about removed all middle management. There was a survey conducted recently by the University of Michigan which indicated the concern of middle management; that they were, in effect, opposing the installation or purchase of any automated systems, basically, because they feared that it would remove the need for middle management decisions. What has been said would seem to confirm this. What are we going to do with these people?

MR. DEAN: Give them a new role.

MODERATOR: Well, we can only shift these roles around so often. Won't we be faced with the elimination problem sooner or later?

Learned "in a rut"

MR. SIMMONS: I think this is the educational problem we talked of. Middle management has done the sort of thing that Mr. Hyde spoke of. They, through experience, have learned—and I don't want to be too negative — but they have learned, "in a rut," the decisions to make. Now we make use of a machine with a model for simulation. The model has built-in "ruts" but middle management can try many different plans on the model in and out of these "ruts." You see, the chief executive does not try these plans on the model, middle management has to do it. So middle management now gets creative and tries a lot of things. And one of the very interesting things about simulation

Continued on Page 42

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Round Table

Continued from Page 40

is that there are some surprising results—some of the things that no one trained in the normal middle management training would ever have had the understanding to try. Now they try it and it turns up a very profitable result.

I think our problem here is to make middle management more creative through education, break him loose from the number of years that he learned to look at reports and teach him to look at the total picture and then try things. It's a great challenge and really makes use of the whole promise of business automation.

MR. SMITH: One of the best examples of this—which has been going on for the last five or ten years—is in regard to the buyer in the chain store grocery, who at one point, was, in fact, the source of the products that they put in the stores. He was totally intuitive. We have found a great reluctance on the part of those men who had been trained over a period of 15 years to accept the fact that they could buy by exception, and that they should be spending their time on the actual turnover of inventory, looking for new items and substitute items and doing a much more profitable job.

It has been difficult to teach them. The simple fact is that these chain groceries have mechanized to a very large extent. The old job of the buyer is no longer important, but his new job is much more a middle management function.

Competitive by knowing

MR. WIKE: I would like to make a comment on the simulation techniques that we have been discussing. The thing that has occurred to us repeatedly is the fact that the hardware performing simulation today is pretty much out of the reach of those people who might utilize it best.

If we think in terms of the largest 500 companies—of the largest 1,000 companies—these people can survive, in many cases, by their own momentum. They are not nearly as vulnerable to failure as the company which does a million dollar business or a half-million dollar business. These are the people who really need to plan their futures on a scientific basis. I haven't heard anything discussed so far that would make me back away from conventional automated equipment—mechanical, electronic and so on—because of its capacity to generate the type of information that these people need. We are inclined to think in terms of large scale computers as being the only means of furnishing this sort of information. I can't believe that this is entirely true.

MR. SIMMONS. I think that we are discussing simulation as though it were the entire objective of automation. It isn't; it's just one small phase of automation. There are many other applications in the area of automation that smaller growing businesses can use. Our latest small IBM data processor, which can be used for these new applications has had the greatest acceptance by both large and small companies of any machine we have ever introduced. Other computer manufacturers also offer small machines. With these new smaller machines, better input and output devices are available and better inexpensive devices for teleprocessing. Conventional punched card equipment can be used for some of the less sophisticated applications.

MR. SMITH: There are a lot of estimates, but I suspect that probably 30,000 different companies today are using punched card installations as compared to two or three thousand at the end of World War II. In 1946, people thought punched cards were only for the Du Ponts and General Motors. The one thing that our industry has done is to provide, through better research and engineering, a less expensive means of mechanization. Punched cards today are relatively stable as opposed to 1946, and, in some cases, less expensive, where you had a growth of, let's say 3,000 to 30,000 users in punched cards.

We foresee, certainly, that the techniques developed by the large concern can almost immediately be applied by the aggressive smaller concern. They can recognize, not the clerical displacement factor as the essence but, "How can I become more competitive by knowing more about my inventory?"

In Conclusion

At the conclusion of the formal round table discussion, members of the audience were invited to ask questions of the panel. Several of the questions related to the "high cost" of programming. Panel members pointed out that in many cases, less than 10 percent of the programming time is spent in actual programming. The major effort, they said, is devoted to putting the company's system "down on paper," which is a necessary prelude to programming.

In concluding remarks, John H. Howard, director of the data processing standardization program for OEMI, complimented the round table panel members for their "successful and interesting conference." Mr. Howard stressed the need for the business press to assume a responsible role in reporting the developments of the industry. He cited the tendency of many publications to stress the "gimmicks and catch phrases" while "ignoring the importance of a thorough and competent reporting job." ■

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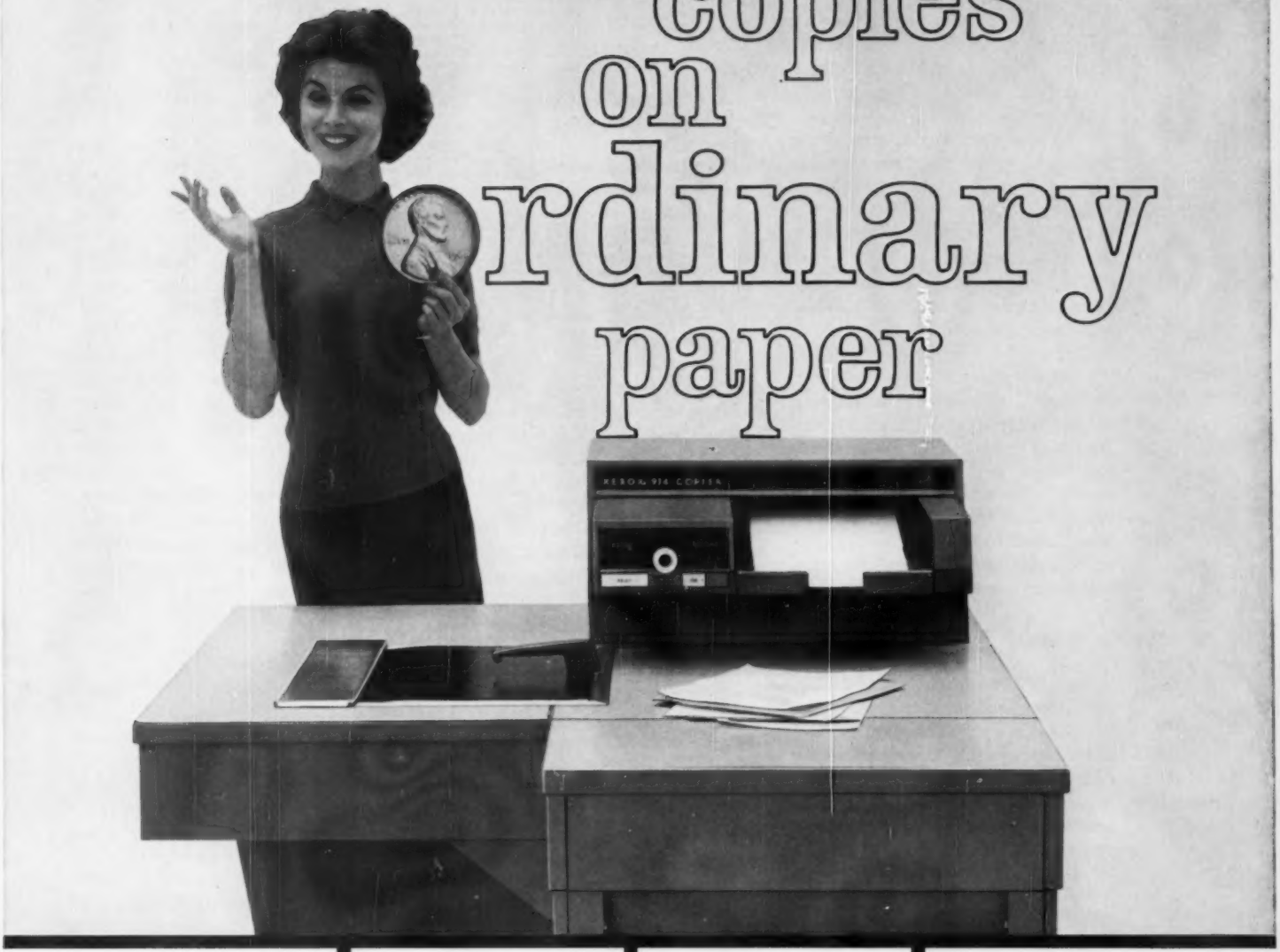

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Crystal Ball

Continued from page 21

the final problem is to know how much of which items to order and still stay within the $800 budget. The reason you were chosen chairman again is because you were able to estimate each variable correctly for three out of the four previous picnics. Even with such a good record, the odds against your estimating all 10 of the variables correctly this year are about 17 to 1!

This hypothetical example is very close to the problems that management must face—find the best combination of a number of variables. As the number of variables rises, so do the odds against estimating all of them correctly. Even with 10 variables, odds of 17 to 1 aren't good when millions of dollars may be at stake. Yet, problems with many times 10 variables are common. Instead of using the old trial and error approach, more and more companies are turning to OR.

A third for storage

Here is the approach used by the operations analyst. He: (1) Studies the objective of the operation and conducts research to determine the essential factors—the cause-effect relationships—involved in the operation; (2) Determines a way to measure the essential factors and the pertinent data that must be collected; (3) Creates a mathematical model of the operation, expressing the basic components of the system in mathematical forms; (4) Uses mathematical techniques to determine the various alternative courses that are practical, and (5) He measures or evaluates each alternative so management will know before it makes a decision just what each course will cost and what the result of the decision will be.

If management can see, in advance, the cost and the result of each practical alternate action, it can decide what to do without guessing. Facts have been substituted for intuition.

A simple decision to expand operations can produce many important questions that must be answered. Assume you are operating a large chain of department stores, and you have three warehouses to store consumer goods. Two of these warehouses are operated in conjunction with retail stores at the same locations. The third is used for storage only. A number of factors—such as termination of leases, obsolescence and a changing consumer market pattern—have led you to consider consolidating your warehouse facilities at a single location. You are also planning to open new stores.

Noon before Christmas

One decision you must make is how many truck service docks will be necessary in the new warehouse to handle both present and future needs. If you don't have enough docks, trucks will have to wait in line during peak periods. If the line gets too long, the trucks spill over into the street and mess up traffic. Meanwhile, you're paying drivers just to sit and wait. Additionally, some of the trucks are rented on a daily basis, and you pay the rent while they wait. On the other hand, if you build too many service docks, you are spending money for something you don't need.

Here is how the Operations Research approach to the problem is used:

First conduct a complete study and analysis of the truck arrivals at the three existing warehouses and survey evidence on truck servicing time. Investigate available warehouse records to measure the extent of seasonal fluctuations in truck traffic volumes. Next analyze the figures to determine which trucks that arrived at the two warehouses operated in conjunction with the retail stores came on retail business only, and which on warehouse business.

Adjust, factor and recombine existing figures to apply to the system being planned, and then simulate future dock operations at the consolidated warehouses by devising a mathematical model on the computer. It must be taken into account when each truck could be expected to arrive and how long it takes to unload or load each truck.

The next logical step is to determine how many docks might be practical and then simulate future operations for each alternative possibility. Finally, simulate, on the computer, the mathematical model of the detailed operations for the pre-Christmas seasonal peak when the greatest truck congestion occurs to determine expected waiting time with a various number of service docks.

The detailed and comprehensive report includes the probabilities of a truck arriving at a certain time, how long the line of trucks would be at the time and how long each arriving truck would have to wait before reaching a service dock—both during normal operations and during the pre-Christmas rush.

When Caywood-Schiller compiled this particular report, it showed that the probabilities were one chance in 10 that a truck arriving between 11 A.M. and noon before Christmas would enter a line of 28 trucks and would wait 24 minutes if there were 15 service docks. With 18 docks, there would be one chance in five that an arriving truck would have to wait at least 15 minutes before reaching a service dock. With 21 docks, probable waiting time could be cut to just eight minutes.

To kill a mosquito

In this particular case, when the Operations Research men began digging, they came up with an unexpected finding as to what really caused pre-Christmas warehouse truck congestion. Surprisingly the congestion was not caused by a big increase in the number of trucks. Instead, it resulted from a big hike in service time. The average truck arrival increased only five percent during peak seasons, but the average loading and unloading time was about 50 percent longer per truck.

Operations Research first gathered, sifted and then analyzed the pertinent facts in order to construct a mathematical model of the essential operations of the proposed warehouse operation. It then projected into the future and presented a complete report to management.

The truck-dock problem is similar to many in widely different business operations. Closely related are problems such as how many check-out counters should a proposed supermarket have, or how

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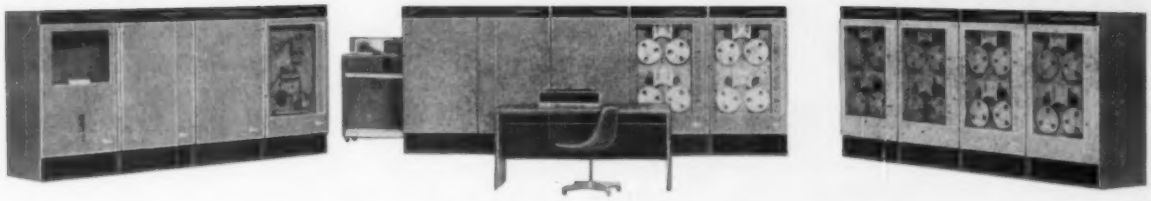

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Crystal Ball

Continued from page 44

many ticket and baggage service counters should an airline terminal have to take care of the expected passenger growth 20 or so years from now. It's not good management to build facilities you *HOPE* will take care of future needs for some time to come and then find out the facilities are *INADEQUATE* in a very short time.

Although conceptually simple, the truck-dock problem was so complex mathematically that no theories existed to solve it. Available waiting-line theories just didn't apply. Had any of them been applicable, the problem wouldn't have been one for OR. Management could have used an existing formula. OR should be used by management only when there is no known method or formula to solve a problem. You don't need a baseball bat to kill a mosquito.

No problem to big

Because it is research, OR devises new ways to solve problems that can't be solved by any of the existing methods. Once OR has come up with a basic formula, it isn't Operations Research any longer, and OR goes on to new and unexplored fields. Also, OR can be useful only if the various elements of a problem can be measured in quantitative terms such as dollars, units, inches, pounds or numbers.

Operations Research became practical as a strategic weapon for the military and as profit insurance for management with the advent of the electronic computer. Until this time, the necessary mathematics was largely theoretical. For years, mathematicians have known how to approach and solve these complex problems, but it wasn't even practical to try.

"So many computations were involved in the theory that mathematicians didn't have the time to work them out," Donald Schiller pointed out. "Without a computer, a man could spend most of his life building and then trying to solve a mathematical expression of a complex business problem. Just as he's about through, he might find out he made a mistake. In checking back, he could find he made the mistake 20 years ago—and he would have to start over from that point. With a computer, it takes just minutes to solve problems that formerly would have taken a team of mathematicians years to solve manually."

Does the complexity of OR problems mean that only the big, expensive computing machines can be used to solve them? Not at all, Schiller said. While the tendency has been to consider such problems the exclusive domain of the extremely large machines, the firm's experience has shown that low-cost computers also can be used in large-scale studies.

"We believe we've had as much or more experience than any firm in the country with different computers," Schiller said. "We've used client computers, government computers, service bureau computers and the giants. But we're convinced that some smaller computers, when properly instructed, can be used as effectively as the larger ones in a complex OR study. We, for example, used a Bendix G-15 to solve the same type of problems formerly programmed on large military and business computers, and we found there was no problem too big for this smaller machine to handle," Schiller pointed out.

Tackling the military

The men who work with Operations Research are in the main highly trained and highly skilled mathematicians. They differ from electronic data processing experts in their approach to the business problem. The EDP expert will show a company how to adapt its present methods and systems to utilize the high speed equipment now available. The OR man digs deeper. He seeks answers to such basic questions as: (1) Is the present bookkeeping or record keeping systems necessary? (2) In what ways can it be improved? (3) What will future needs be? (4) Is EDP the best and most beneficial improvement? (5) Which of the many available systems will fit the needs best at present and in the future?

Management has been turning to Operations Research because OR is accomplishing its objectives of insuring profits most successfully. For one company, the OR technique was used to develop a method whereby the company could use a computer in its production operations. This method is saving the company millions of dollars a year. For another company, OR programmed a computer to design custom-built motors and machines, reducing design time for each job from four days to 12 minutes. This resulted in a substantial cost cut. To solve a problem similar to the one OR first tackled for the military, the Operations Research technique was used to develop an optimum scheduling plan for a company that had a fluctuating work load so that its employes, paid on an hourly basis, would be in the plant at the various and unforeseeable peak periods of work.

Jungle of facts

Management must, of course, identify its own problem. It must be one involving factors that can be measured and it must be one that can't be solved by any other existing method. If a decision is to be made, OR helps guide management. Management itself must make the decision. The decision must be based on facts, and the bigger the decision, the more facts are needed —not a confusing jungle of facts but a logical array of pertinent information. To this end, Operations Research determines which facts are pertinent, develops mathematical formulae to determine and test various alternative courses of action that are feasible, and it presents them to management.

With only about five percent of companies in this country currently using OR, the surface has barely been scratched. The question no longer is—Should a company use Operations Research? The question is—How can OR be used for the best results? Its future appears to be limited only by the number of men that enter the field with the necessary training and talents. OR opens the door to scientific management. It answers a resounding "Yes!" to management's favorite lament—"There must be a better way to do what we're doing." ■

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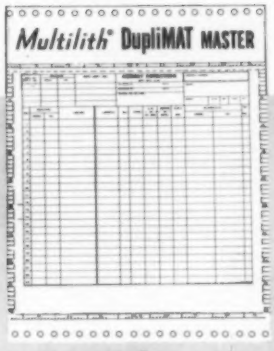

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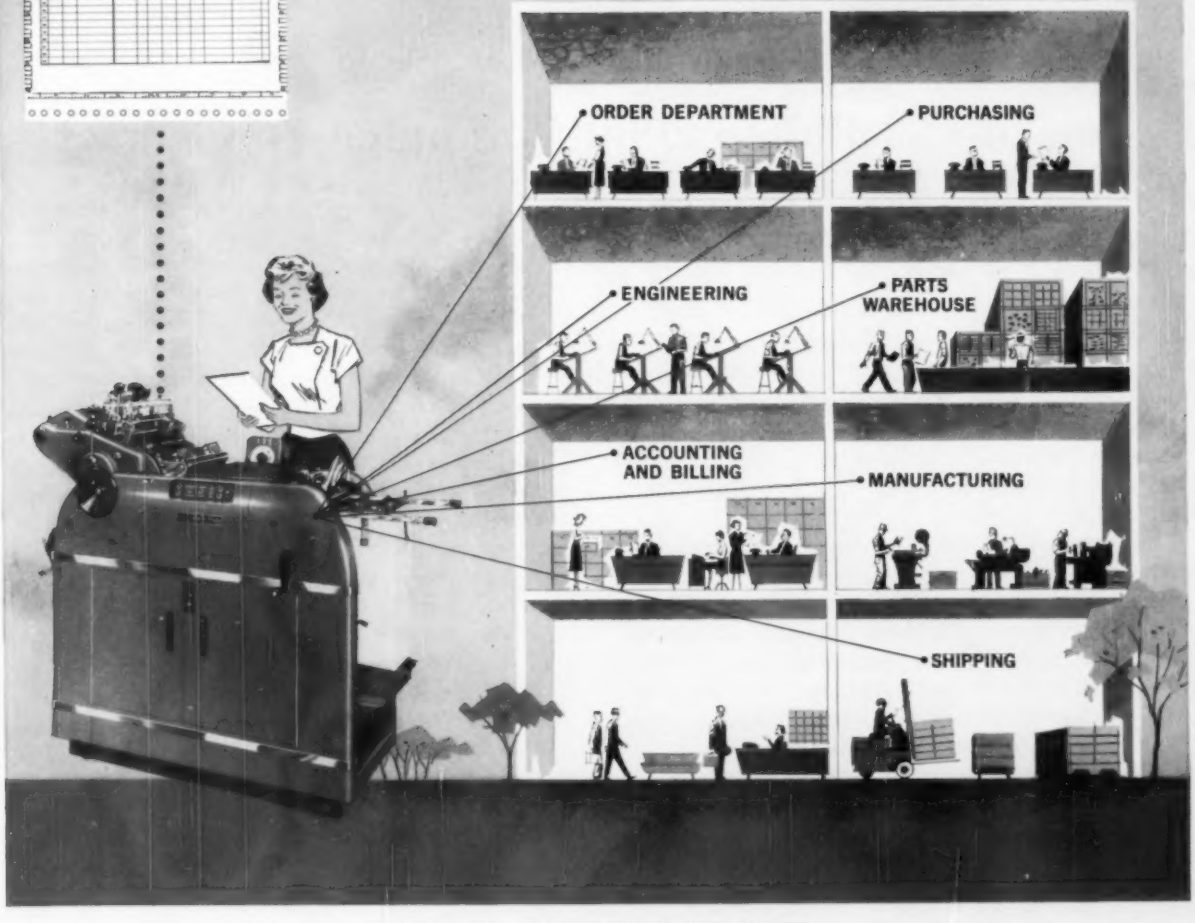

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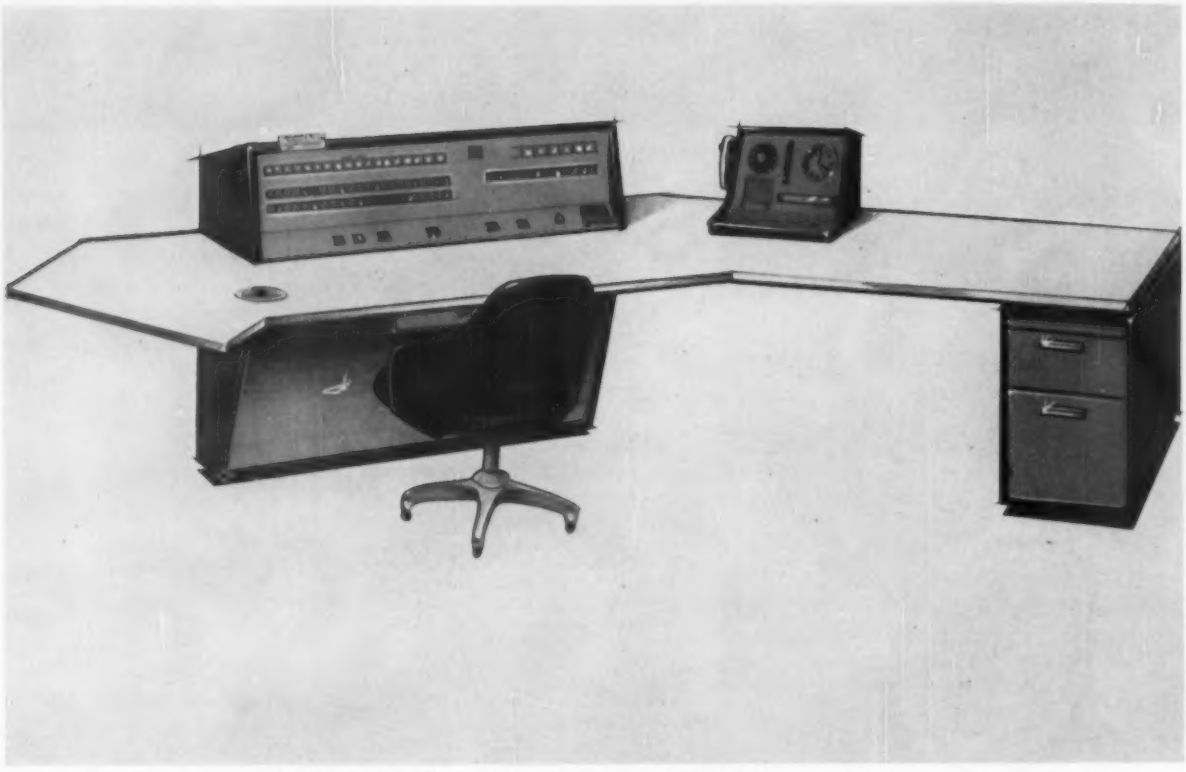


Designed for compatability with Philco 2000 systems, the Model 212's simplified console is shown above.

New Model Philco 2000 Computer Announced

Product Preview

PHILCO CORP. has announced the addition of a new Model 212 computer to its 2000 series. The new computer, the company states, is four times faster than other models in the line and is a general purpose computer designed to serve the data processing needs of the businessman, scientist and engineer.

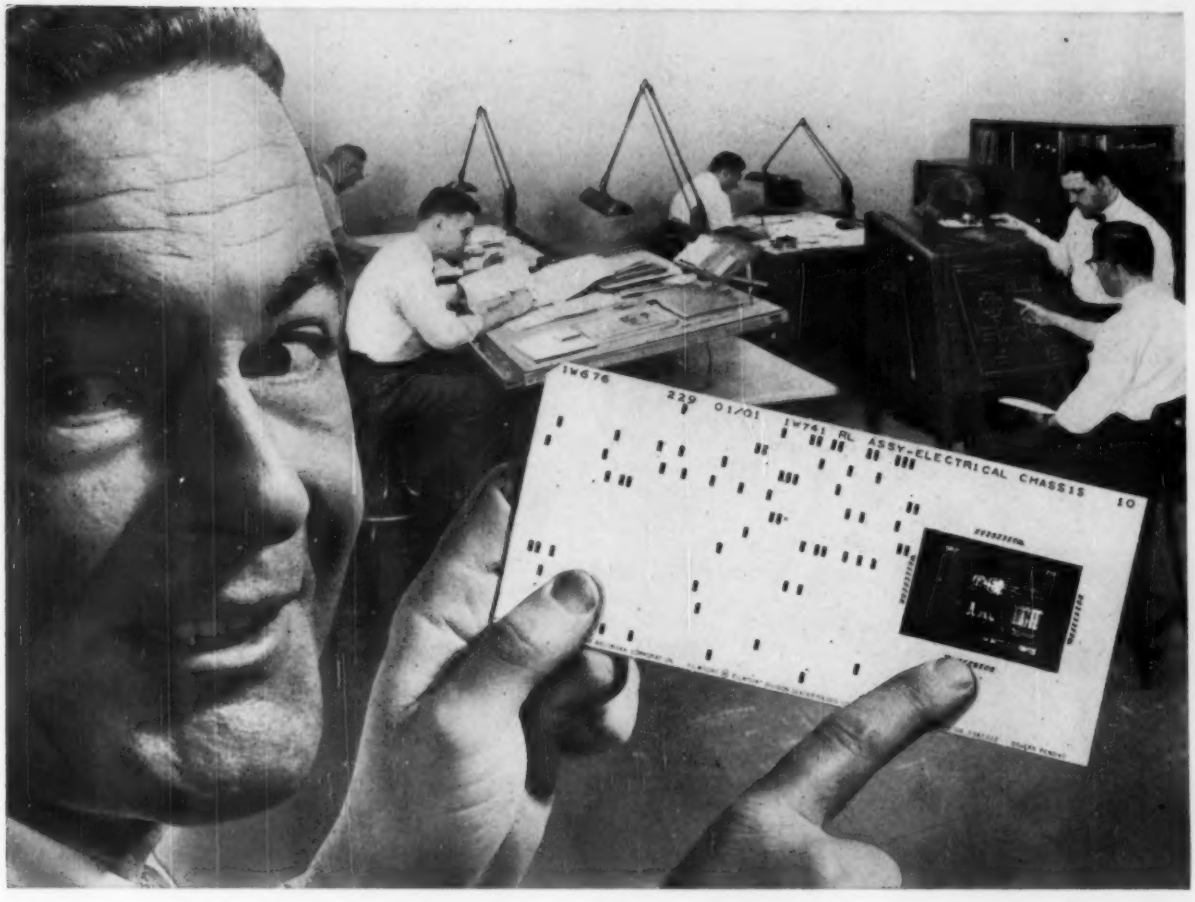
Improvements have been made to balance the computer with faster circuits and new logical organization. The simplified console of the Philco 212 assures speed, efficiency, flexibility and economy. The new unit is compatible with other Philco 2000 models, and programs and routines used on Models 210 and 211 can be run on the Model 212 without reprogramming.

Model 212 can multiply two 48-bit words in under ten microseconds, including access time. Maximum access time for a pair of instructions is one microsecond. Under normal conditions, access time is less than one-half microsecond.

Advanced four-way processing permits four instructions to be processed simultaneously, featuring "asynchronous" processing — progresses from one operation to another without time lag — between instructions, as well as within an instruction. For example while the computer is storing or waiting to store the result of an instruction, it is executing the next instruction, indexing and getting operands for still another, and obtaining the next four instructions from memory.

The number of controls on the console have been reduced, and the instruction catalog has been expanded to include 248 instructions for flexibility. Four models of automatic index register modification assure maximum program efficiency, and repeat functions have been expanded to permit automatic looping of up to four instructions.

Contributing to economy of operation are more effective use of memory, faster running time and reduced programming time. The advanced four-way processing is another economic factor in the Philco Model 212 computer. Circle No. 104



Recordak microfilms more than meet DOD requirements!

Recordak Precision Microfilming gives you better than 120 lines per mm resolution at 30 to 1 reduction ratio.

This assurance of high-quality reproductions on low-cost 35 mm Recordak microfilm should be important news for all firms working with the Government. *And equally important* for all others who plan to automate their engineering drawing files for increased efficiency.

It's a fact, *proven many times over*, the success of an automated drawing program depends *mainly* upon the quality of your microfilm pictures. They must be completely legible when checked in film readers . . . and they must also produce accurate, easy-to-read paper prints and duplicate microfilms.

Send for free booklet giving details on this precision microfilming system available through Recordak and its nation-wide dealer organization.

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RECORDAK®

(Subsidiary of Eastman Kodak Company)
originator of modern microfilming
—now in its 33rd year
IN CANADA contact Recordak of Canada Ltd., Toronto

For More Information Circle Reader Service Card No. 173

Business Automation Showcase

Photocopy Dryer

High production with high quality drying of photocopies and other materials in cut sheet form are features of a new Jumbo Dryer made by Paragon-Revolute Div. of Charles Bruing Co. Speeds up to 16 feet per minute are provided, and the machine is available for either 42 or 54-inch paper widths. A 24-inch diameter heavy steel drum, with sufficient mass to retain the required amount of heat, does away with the need for localized cooling. Gas or electricity can be used as the heat source with a thermostat control. Circle No. 115

Tandem Collators

Newly engineered, semi-automatic and mechanical 20 and 32-sheet floor model collators have been introduced by Thomas Collators, Inc. Used for gathering duplicate sheets into sets, these tandem collators provide for a range of sheet sizes and variety of weights and finishes to be used. Two-step adjustments provide accommodations for sheet sizes from four by five inches to 17 to 22 inches. Special sheet "separators" assure single sheet feeding. Circle No. 111

Tape Transport System

Model M-3000, a completely, self-contained Digital Tape Transport System, has been introduced by Midwestern Instruments, Inc. Featuring speed ranges from 37½ to 150 inches per second and a rewind speed of over 400 inches per second, the unit employs an electro-pneumatic tape drive system using compressed air. Supply and take-up reels are placed side-by-side over the central drive permitting straight-line threading. Circle No. 110

Single Unit Photocopier Serves Many Purposes

A single photocopying unit which offers the space saving and economic advantages of photocopy reduction as well as being capable of copying from either microfilm or conventional paper originals has been introduced by Photostat Corp. The Model 10.14 can reproduce office records and graphic materials at the rate of 10 copies per minute for about three cents a copy. Any subject, up to 20 by 28 inches in size, can be copied regardless of color. The unit will enlarge up to 10 by 14 inches and reduce to six by eight inches. Dry copies can be made on a variety of available photocopy papers. Operations of the 10.14 are electrically controlled. Circle No. 106

TO KEEP INFORMED...

every operating executive in data processing needs these two basic reference services

OFFICE AUTOMATION

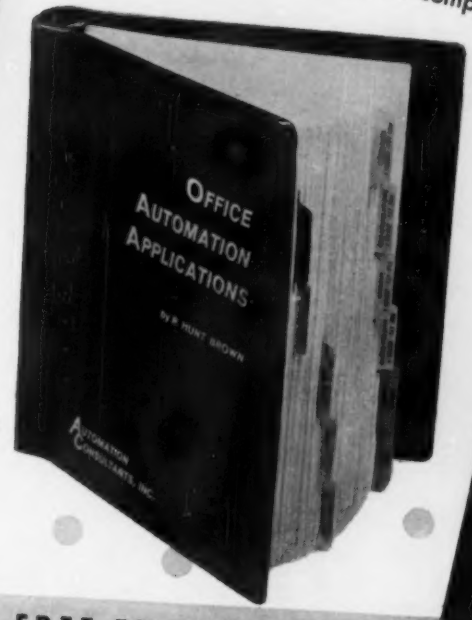
Featuring detailed descriptions of machines and equipment.

Explains the capabilities of all types of IDP/EDP machines and hardware including input equipment, computers, memory systems, output equipment, and associated peripheral devices. Contains valuable reference material including programming, bibliographies, sociological aspects, research and development.

OFFICE AUTOMATION APPLICATIONS

Featuring case studies of actual automated systems.

Explains how automated data processing systems are currently operating in named organizations. Covers inventory control, sales analysis, billing, production control, accounts payable, order-invoice systems, forms control, high-speed addressing, operations research, communications, and other procedures. Contains hundreds of photos, forms, flow charts and diagrams . . . plus a unique directory of computer users.



These references are the only loose-leaf services available devoted to electronic data processing and the full scope of automation in the office. The latest hardware and installations are emphasized with very little attention given to conventional punched card processes. A monthly updating subscription insures that each volume is completely up-to-date and can be relied upon as the basic, authoritative source of IDP/EDP information. Written in non-technical language, all material can be understood by executives in top or middle management.

Each handbook contains 600-800 pages with over 500 illustrations—equal to an entire series of bound books. Hard vinyl covers, tab separator sheets, and a long-lasting 3-prong mechanism insure long life and easy use.

Automation Consultants, Inc., is now owned and managed by the publishers of MANAGEMENT AND BUSINESS AUTOMATION and has available the extensive editorial resources of the magazine. The experienced writing staff of the loose-leaf services is headed by R. Hunt Brown, founder of the company. Over-all editorial direction is provided by Arnold E. Keller, MBA/s Editor.

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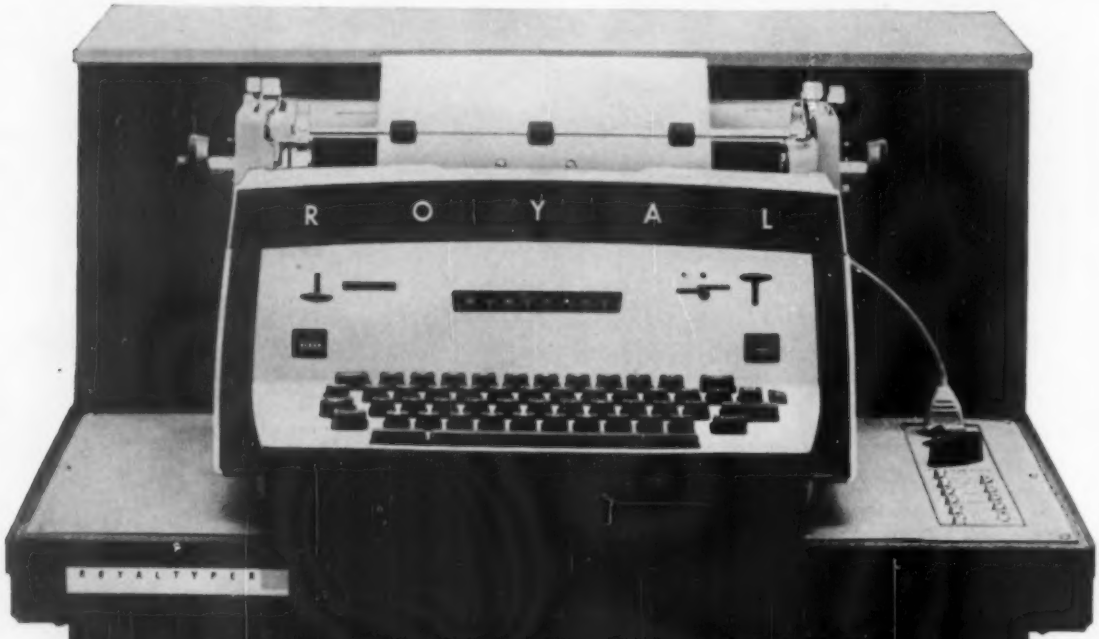
Finally, a single system automatic typewriter— it does its punching and its typing all with this one simple standard keyboard.



Its name is Royaltyper. Its maker is Royal McBee. It is brand new. Its cost is in line with suddenly outmoded two-unit systems.

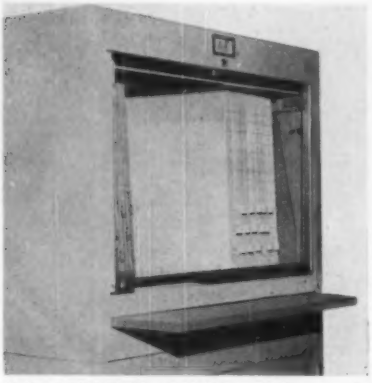
Any typist can operate it, just as she operates her typewriter. Directions: roll in a piece of paper... flick a switch... type the first letter. This automatically punches the tape and the operator sees every word she is punching—no blind punching as in outmoded systems. Then the machine takes over—all by itself. At 135 words a minute all day long. Number of copies: unlimited. Number of rest periods: none.

Does your company ever have personalized first-copy mass mailings to get out? Is your company tired of paying the high cost of independent punching service, or of training employees to punch on complicated outmoded systems? Then get in touch with Royal McBee Corporation, Port Chester, New York, for full information on the brand new Royaltyper.

Product of Royal McBee Corp., World's Largest Manufacturer of Typewriters. ROYAL®

For More Information Circle Reader Service Card No. 174

Visible Index File

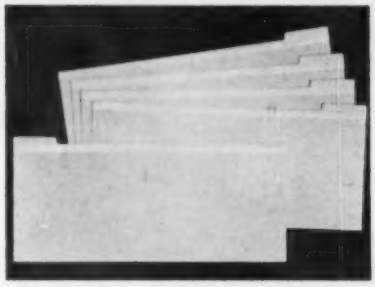


Select-A-Matic Visible Index unit has been introduced by Remington Rand Systems Div. With the Index unit, records are protected in areas where heavy reference traffic might normally damage papers or the usual record ledgers and files. Thousands of references are available in a single, tamper and dust proof housing. All necessary information can be transcribed directly on the reference cards to preclude the need for handling of original documents or ledgers. A selector arm facilitates finding a reference without fingering records or reference cards. In removable frames, 180 indexes may be stored on both sides —9,000 per unit. Circle No. 108

Tipper-Collator

The portable Pacmaker Jr. enables an operator to collate carbons and sheets and automatically spot-glue them into multi-copy, snap-out forms at the rate of 1850 sheets per hour. With the motor-driven tipper-collator, developed by Super Speed Printing Machinery, Inc., in-plant reproduction departments and printers will be able to do their own multi-copy form assembly. Pacmaker Jr. handles sheets from 4 by 4½ inches up to 13 by 16 inches. Circle No. 118

Reinforced Tab Guides



Tab guides which enable fast reference to data processing information have been developed by the G. J. Aigner Co. The new AICO Tab Guides are reinforced by a strip of DuPont Mylar plastic film across the tab and top edge of the card. This provides needed rigidity for the tab to withstand hard usage. In addition, the smooth plastic surface prevents soiling of the tab from handling. The Mylar film is very thin, permitting the reinforced tab guides to be run through tabulating equipment with the data processing cards. This eliminates the necessity of pulling the guides from a deck of IBM cards before processing. Circle No. 105

Farrington Bookleteer® collates, jogs, stitches and folds 4500 booklets per hour

If you collate or produce catalogs, bulletins, contracts, price lists, sales manuals . . . **anything** with multiple pages . . . you should know about the Farrington Bookleteer.

This high-speed collator automatically converts flat printed sheets into 4- to 80-page booklets in one single operation. A 4-stage collator will make a 16-page booklet. The Bookleteer, like all Farrington Collators, is available with collating units from 4- to 20-station capacity.

As a **Collator,** the Bookleteer maintains a speed of 4500 sets per hour . . . **regardless of the number of sheets per set.** Collated sets can be made without folding.

As a **Stitcher,** the Bookleteer is equipped with two stitcher heads. These automatically saddle-stitch . . . or they can be adjusted to stitch with either of the two stitches at any desired position.

As a **Folder,** the Bookleteer makes letter folds, booklet folds, accordion folds.

It's the most versatile collator you can buy—all of its functions can be used separately. Cut collating costs sharply with one of these remarkable machines. For information, mail the coupon.

FARRINGTON®

FARRINGTON BUSINESS MACHINES CORPORATION
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Needham Heights, Mass.
Please send me more information on the Farrington BOOKLETEER®.

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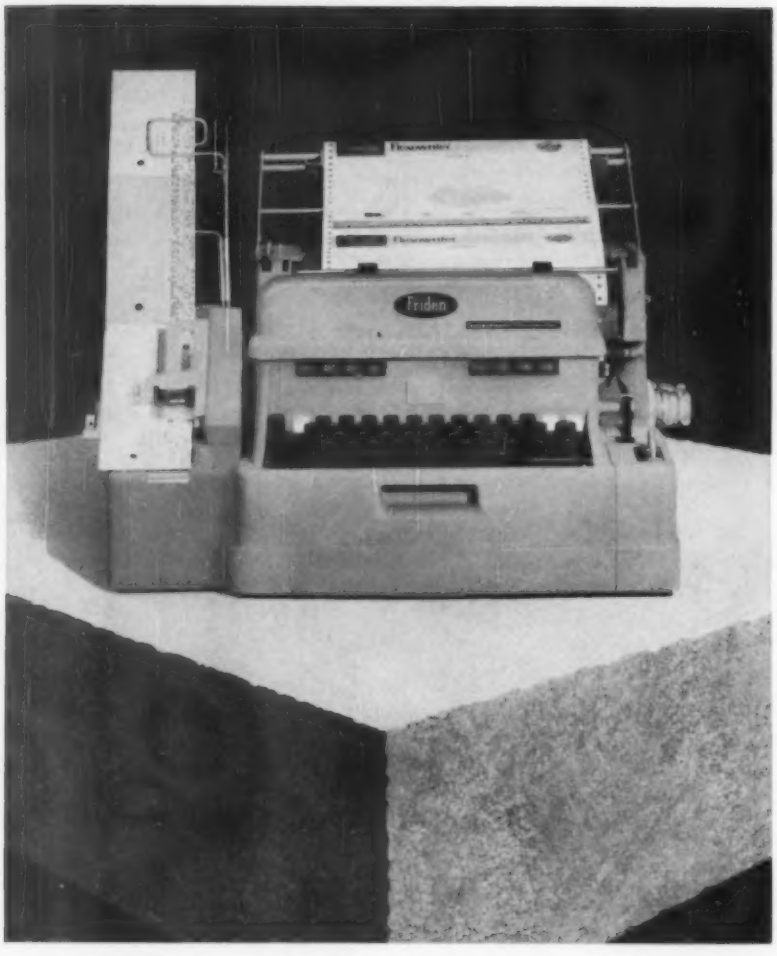
For More Information Circle Reader Service Card No. 175



Automation Cornerstone

The Friden Flexowriter® has three basic capabilities: 1) It can type, 2) it can *record* what is typed on punched paper tape, 3) it can *read* tape back to itself, retyping automatically at 100 words per minute.

These things are remarkable enough, but the important point is this: Tapes produced on the Flexowriter can automatically control a great variety of *other* machines—those made by other manufacturers as well as by Friden. Thus the Flexowriter performs the key task in automation, *translating human language into a language that machines understand.*

Applications for the Flexowriter are immensely varied. It allows man to converse with computers. It prepares tapes that control automated machine tools. It's also bringing about a major revolution in the handling of basic business paperwork. And the surface is only scratched.

It will pay you to learn more about this machine and the jobs it could be doing for you. Your local Friden Systems Representative is the man to see. Or write: Friden, Inc., San Leandro, California.

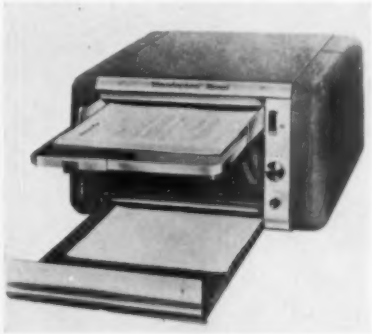
THIS IS PRACTIMATION: automation so hand-in-hand with practicality there can be no other word for it. © 1961 FRIDEN, INC.

Friden

SALES, SERVICE AND INSTRUCTION
THROUGHOUT THE U. S. AND WORLD

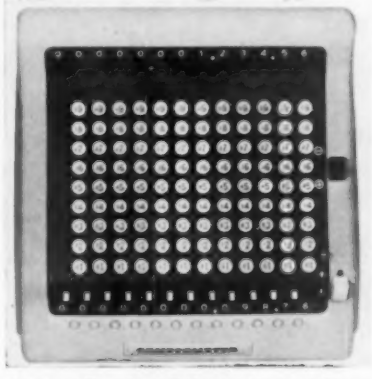
For More Information Circle Reader Service Card No. 176

Portable Rotary Camera



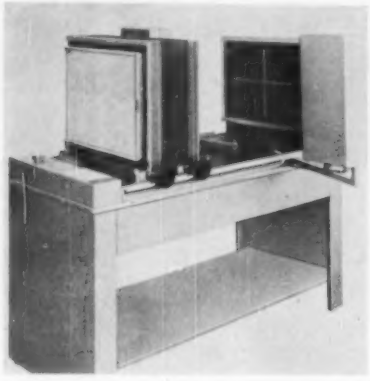
The first transportable rotary camera that operates with 35mm film has been announced by Remington Rand Systems Div. The Film-a-Record "Pacesetter" is a compact unit featuring daylight loading, automatic feeding, visible film supply indicator, and warning signals. A reduction ratio of 12 to 1 on 35mm microfilm assures images of high resolution for electrostatic printing operations and quality paper enlargements. Feeding and receiving trays are detachable and fit inside of the machine. Records up to 12 inches wide and any length can be accommodated at 150 feet per minute. Circle No. 112

Duplex Calculator



A new Duplex Calculator has been announced by Comptometer Corp. It features two answer dials, one of which stores or "memorizes" totals transferred to it from the other dial. "Direct action" control is maintained by two special keys. Addition, subtraction, rounding off and full cent conversion can be continuously shown in the accumulating memory dial by using these keys. Positive decimal pointers to insure accuracy and short stroke controls are other features. Circle No. 117

Horizontal Camera



The M. P. Goodkin Co. Horizontal 18-inch Camera will expose, in or out of a darkroom, line and halftone negatives, Gevacopy Rapid Negatives and Ektalith Transfer Paper in sizes up to 14 by 18 inches, through a varied enlargement-reduction range. Equipment is about the length of an office desk. Controls for adjustment of lens and film platens are both located on the same side of the unit. Accessories include a stand and vacuum back, pump and motor. Circle No. 121

Word Counter

A new word counter automatically measures message traffic on teletypewriter circuits and presents the numbers on its illuminated face for easy reading. Operating at 60, 75 and 100 word-per-minute speeds, the inexpensive, compact unit is manufactured by the Western Apparatus Div. of the Comptometer Corp. It features a built-in transistorized line relay which permits a direct connection into any printing telegraph circuit with no inductive effect and negligible signal distortion, saving on the cost of an auxiliary line relay. Circle No. 102

Film Whiteprinter

A whiteprinter specifically engineered for processing sensitive films but equally capable of all office paper work has been introduced by the Ozalid Div. of General Aniline and Film Corp. The table-top copier has a 13-inch opening, a streamlined cooling system to keep temperature down and gives prints full exposure at printing speeds from one to 20 feet per minute. Applications include running prints from photographic film positives, producing transparencies for overhead projection and processing double-coated sensitized materials. Small engineering prints, copies for office systems and routine paper work can be made. Circle No. 116

One machine to label postcards and magazines?

Yes . . . and at cost-cutting high speeds up to 16,000 per hour! The Cheshire Model E adjusts easily to handle small postcards and envelopes . . . middle-sized pamphlets and brochures . . . or even larger magazines, catalogs and quarterfold tabloids. Applies all types of labels, too (wide-strip, narrow-strip, continuous pack form, cut or individual labels) . . . whether they're pre-addressed from your punched cards, plates, stencils or other addressing systems. Compact . . . and easy to operate.

The Cheshire Model E.

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For More Information Circle Reader Service Card No. 177

New Hano VERTI-BAR Shaded Column Forms are available in both Tabulating and Snap-a-Part styles . . . unsurpassed for Sales Analysis Reports, Inventory Control, Invoices and other records. Example: this Jantzen Inc. Tab Invoice.

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Thousands of Dollars In Paper Work Errors. Use

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With Shaded Columns to Spotlight Figures for Accurate Reading, Posting, Pricing and Analysis on Invoices, Work Forms and Many Other Records

New Hano VERTI-BAR Tab Forms reduce errors in paper work, save money, speed up your office system. VERTI-BAR costs no more than outmoded forms.

Judge for yourself . . . ask for samples from

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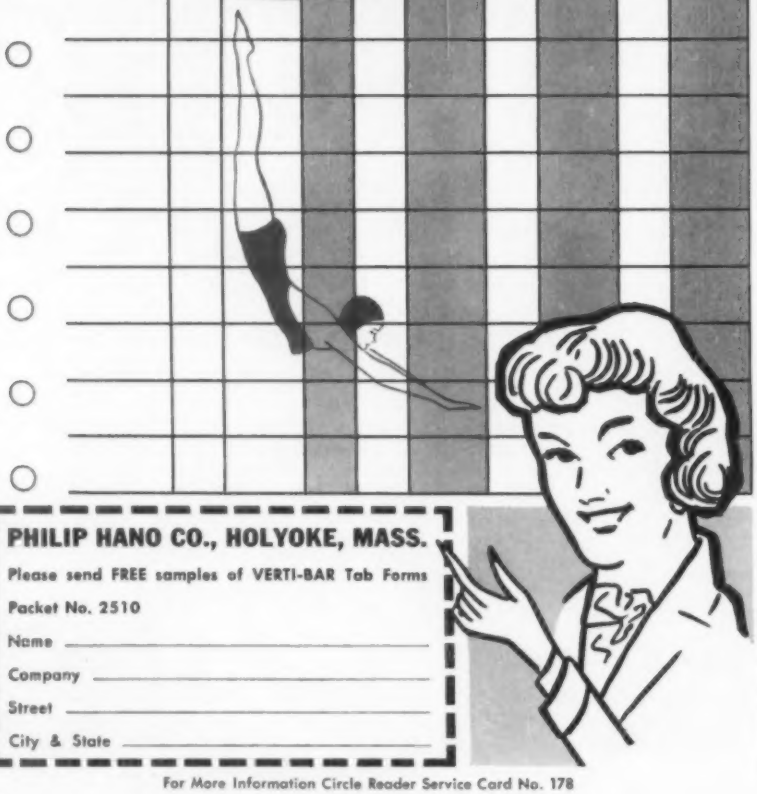

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Please send FREE samples of VERTI-BAR Tab Forms

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Company _____

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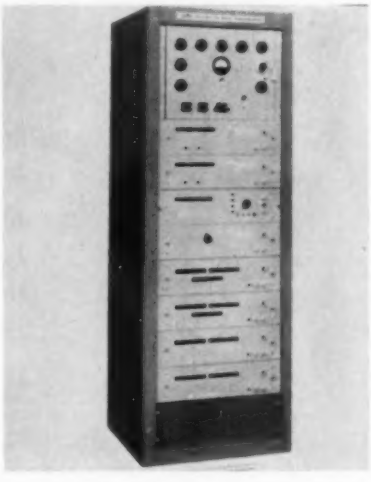
City & State _____

For More Information Circle Reader Service Card No. 178

Paper Handling System

An automatic paper handling system for transferring complete files and books, as well as single sheets, has been introduced by M-H Standard Corp. The Monoflo Paper Handling System consists of a rotating cable conveyor and three different types of paper carriers. A paper clip hook will hold individual sheets on the conveyor and move to another work station at the rate of 12 feet per minute. A file folder carrier is available for complete files, and if many sheets or a book is moved, there is a special paper tray carrier that attaches to the conveyor. Circle No. 113

Analog & Digital Linkage

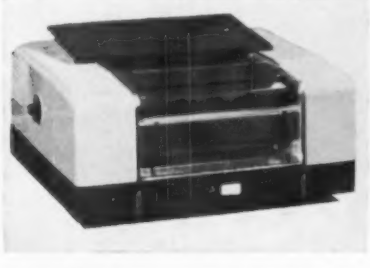


Computer linkage equipment combining analog and digital computers into a single system are now available from Packard Bell Computer Div., of Packard Bell Electronics. A standard analog computer and any one of several digital computers can be "plugged together." Two basic systems, Models DS-110 and DS-113 offer 11-bit and 14-bit precision, respectively and are available with 30 input and output channels. Circle No. 109

Intercom System

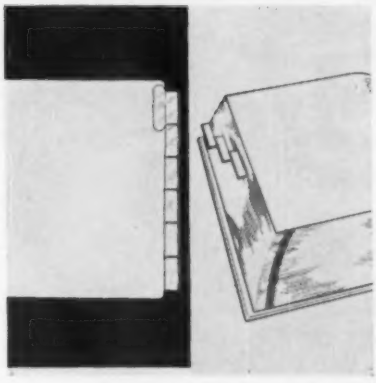
The Ring Master, hands-free electronic intercom system has been introduced by the International Magnefonics Corp. The compact unit has 10 touch buttons for dialing stations. Soft tones and a signal light form a paging system, or indicate when a call is coming in. The sensitive speaker can give life-like vocal reproduction up to 25 feet away. Dialing is by push button on an index directory panel. A reject button stops inconvenient incoming calls. There is a single channel system to accommodate up to 18 stations. Circle No. 120

Electrostatic Photocopier



A small photocopying machine, capable of copying "anything printed or written, even in color or ballpoint pen ink," has been introduced by the Savin Business Machine Corp. The photocopy device requires no lens and produces electrostatic copies in 10 seconds by a reflex rather than a direct method. The machine is capable of copying material from two sides of a page onto two sides of ordinary paper. Many types and colors of copying paper can be used to facilitate a color code system. A special unit incorporated into the machine will feed copy paper automatically. Dry, 8½ by 11-inch facsimile copies are expected to be produced for about four cents each. Circle No. 114

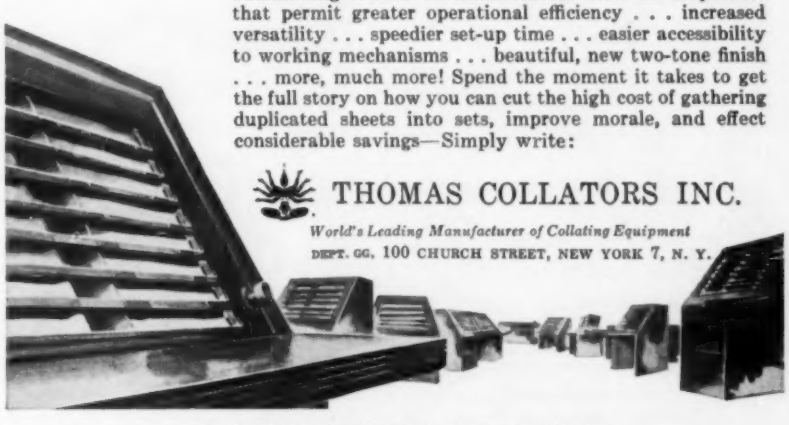
Forms Control Index



A new index, specially designed to provide instant reference to tabulated data in thin post binders has been developed by G. J. Aigner Co. Inserts are styled to accommodate special titles and the index tabs are fused in clear plastic. Index sheets are reinforced on the binding edge with a strip of Mylar plastic film to prevent wear and tear. The sheets are control punched with 5/32 inch holes on ½ inch center to fit all ⅛ inch thin post binders, and are available in continuous strip form. Circle No. 122

10 New Floor Models for '61

For 1961, Thomas Collators announce engineering and design advancements for their new line of 8, 10, 16, 20 and 32-sheet floor models that help surpass their own outstanding record of achievement. New developments that permit greater operational efficiency . . . increased versatility . . . speedier set-up time . . . easier accessibility to working mechanisms . . . beautiful, new two-tone finish . . . more, much more! Spend the moment it takes to get the full story on how you can cut the high cost of gathering duplicated sheets into sets, improve morale, and effect considerable savings—Simply write:



THOMAS COLLATORS INC.

World's Leading Manufacturer of Collating Equipment

DEPT. GG, 100 CHURCH STREET, NEW YORK 7, N. Y.

For More Information Circle Reader Service Card No. 179

RECORD STORAGE • RECORD
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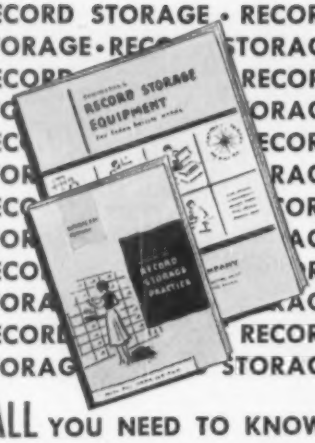

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Send for your FREE "Manual of Record Storage Practice" telling you how long to retain or destroy business records. It outlines an easy-to-do storage plan for inactive records.

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Over 4 years experience in
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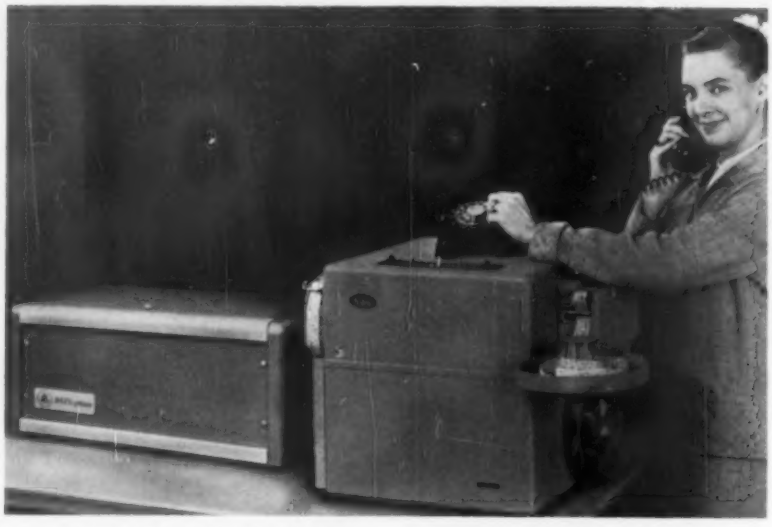
Circle Reader Service Card No. 181

Teledata Transmitter-Receiver/Data-Phone System



A new model Teledata eight-channel code transmitter-receiver to be used in conjunction with the Bell Data-Phone 100 over toll message networks of long distance lines has been announced by Friden, Inc. It represents a fast, economical means of communicating business data and other messages between branches, plants, and the home office. Speeds of 425 codes per minute are obtained, and a parity checking feature insures that transmitted codes are accurately perpetuated for accomplishing subsequent data processing functions efficiently. Message tapes are punched and then taken to the Teledata/Data-Phone transmitting center where they are fed through the Teledata reader component. Contact is made with the receiving station by phone, both parties touch a button on respective subsets. Circle No. 107

Paperveyor–Overhead Paper Handling System

Paperveyor, an overhead paper handling system for office and warehouse use, has been developed by the Chainveyor Corp. Orders, invoices, punched cards, blueprints, correspondence, in fact, any office papers can be dispatched to any sequence of locations and be automatically unloaded at preselected stations anywhere in the office. This system makes it possible to maintain a continuous flow of vital working papers from one desk, machine, work station or file area to another. Mechanical action carriers hold papers safely and easily without folding or rolling. Papers once inserted between the holding clamps, or a carrier, cannot loosen or drop while in transit. A cam-release trip bar at preselected discharge stations, anywhere along the Paperveyor's path, automatically deposits papers where needed. Circle No. 103

Copies On Request

The following booklets, catalogs and brochures are considered of interest to readers of MANAGEMENT AND BUSINESS AUTOMATION. Copies *can be obtained by using the Reader Service Card.*

Univac 490 Real-Time System—A descriptive circular from Remington Rand Univac Division explains the concept, characteristics, features and applications of real-time computing of the new 490. Circle No. 131

Tape-operated Communications—A 10-page booklet from Friden, Inc. explains the latest information on the Dual Teledata Transmitter-Receiver. Circle No. 132

Office Procedures Handbook—A detailed booklet, "How to Solve Office Problems on the Spot," is offered by Transcopy, Inc. Techniques presented show how to cut dictation time, speed communications and simplify correspondence. Circle No. 133

Duplicator Paper Sample Book—Mead Papers, Inc. has prepared two new duplicator paper sample books, one covering the Mead Duplicator line and the other the Moistrite Duplicator line. Circle No. 134

Panels and Accessories—Tech Panel Co. Inc. has released new price lists and brochures covering panels-accessories. Circle No. 135

Evaluating Adders and Calculators—The Victor Adding Machine Co. has made available job evaluation survey forms for rating adding machines and calculators in their specific jobs. The evaluation is applicable to any brand of machine. Circle No. 136

Two-way Radio Equipment—General Electric has published a series of new bulletins on its Progress line of two-way radio equipment containing information on mobile communications. Circle No. 137

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For More Information Circle Reader Service Card No. 182

NEWS

Air Force Activates Charleston Computer

Lt. Gen. Joe W. Kelly, Military Air Transport Service Commander, is at the console of the 7070 computer now in operation at the Charleston, S. C. Air Force Base. With him are Brig. Gen. Franklin S. Henley, left, commander of the 1608th Air Transport Wing, and Lt. Col. Cecil E. Crawford, comptroller.

A prototype program to cut costs and streamline airlift operations through use of an electronic computer was launched by the U. S. Air Force at their Charleston, N. C., Military Air Transport Service Base. (MATS—A Global Operation, Dec. '60.)

The base, an aerial port of embarkation for MATS flights to Europe, Africa and the Middle East, is one of the first in USAF to have its own computer. An IBM 7070 will be used to determine whether centralized computer systems can be operated economically at base level throughout the Air Force.

The Charleston computer will process data for a wide variety of base functions, including an up-to-the-minute supply inventory system, aircraft maintenance control, installation engineering, air operations planning, personnel accounting and accounting finance operations. One of the most complex jobs assigned to the 7070 is the inventory control program. Complete details of more than 40,000 supply items have been electronically stored in two large disk files of the computer.

A remote inquiry station is located in the base warehouse, a quarter of a mile away. Whenever items are requested, a punched card is prepared and inserted in the remote inquiry unit. In less than a minute, the computer checks the inventory, withdraws the items, updates the balance, charges the proper account and prints out appropriate issue slips on an electric typewriter at the inquiry station.

Brig. Gen. Franklin S. Henley, Commander of the 1608th Air Transport Wing at Charleston, estimates that more than 50,000 such transactions per month are made at the base.

The computer reports when an item reaches a low level and will refuse to issue it unless given a special priority number. It has also been instructed to handle security-classified materials, such as high value items or missile parts. A special code, known only to personnel who are responsible for the information, is keyed into the machine along with other data. When this special code is not used, a reject notice is printed for the operator, indicating this information is not authorized.

Announce Officers for Automation Consultants

New Officers of Automation Consultants, Inc., now managed by the publishers of Management and BUSINESS AUTOMATION, have been announced recently.

Charles W. Gilbert, publisher of the magazine, has been elected president. Arnold E. Keller, editor, has been named vice-president. Secretary-treasurer is Richard M. Daugherty, who serves in the same capacity for The Office Appliance Co., owner of Automation Consultants.

R. Hunt Brown, founder of the Office Automation handbook series, has been named managing editor. Walter Riley has been advanced to the new post of business manager.

Automation Consultants will continue to operate at 155 Fifth Ave., New York City. Additional editorial offices are being established in Chicago and Los Angeles.

Chicago Management Group Plans Show

The Office Management Association of Chicago holds its 1961 Chicago Business Show and Midwest Seminar, co-sponsored by Northwestern University, at the Conrad Hilton Hotel, Chicago, February 27 through March 2.

Seminars, running concurrently with the show, are designed to appeal to all levels of office administration. Three main areas covered are: personnel, data processing and office services. In the data processing seminar, OMAC members suggest particular applications in the electronic or mechanical field that are specific business problems. IDP and EDP equipment exhibitors show administrators ways to solve the business problem and the operational savings involved.

The event will be keynoted by, "Mr. Office Manager," Mr. Harry Wylie, assistant secretary-treasurer of Pure Oil Co.

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San Francisco SPA Sets Spring Conference

The Tenth Annual Spring Conference on Systems and Procedures will be held by the San Francisco Chapter of the SPA at the Hotel Mark Hopkins on April 21, 1961.

Professor Paul Kircher, University of California, will speak on "How the Systems Man Will Replace the Middle Manager—If He Survives." Everett Calhoun, Stanford Research Institute, will give a "General Review of Computer Hardware." Charles E. Grody, New York Life Insurance Co., will talk on the "Psychological Aspects of Communication."

First Computer Program Interchange Successful

Radio Corp. of America and Remington Rand announced that for the first time computer programs utilizing plain English have been successfully interchanged between data processing systems of different manufacturers.

The report followed a two-day demonstration by Univac Div. of Sperry Rand Corp. and RCA's Electronic Data Processing Div. before the Executive Committee of the Conference on Data Systems Languages (CODASYL), a government-sponsored group formed to achieve computer compatibility. The programming language used was COBOL. (March, 1960 issue.)

New Firm Specializes In Information Retrieval

Intectron, Inc. of Newton, Mass. has been set up to do research and development on systems, devices and equipment for computation, communications and control.

Special emphasis will be placed on improving the physical accessibility of documentary information.

GE to Construct Computer Laboratory

Plans for establishment of a new Advanced Computer Development and Research Laboratory at Sunnyvale, Calif., were announced by General Electric's Computer Dept.

HOW PHILCO'S KEEPS

PHILCO'S 8-STUB TICKET — shown actual size — provides 5 sources of data for automatic processing of Daily Reports of: Production Count by Model and Type, Production vs. Warehouse Receipts, Warehouse Inventory by Model and Location, Shipments by Model, Relief of Inventory and Sales by Model. The other three stubs, permanently attached to each set and its carton, make identification quick, easy and accurate.

UNIQUE CONTROL SYSTEM 93% CLOSER TRACK OF TV SETS

THE HEART OF PHILCO'S SYSTEM is the Finished Goods Control Center, directed by Walter Wagg. Here, large quantities of tickets are processed by Dennison Print-Punch Machines to provide the multiple checks which keep close tabs on Philco TV sets. Here, too, stubs are counted and matched when returned from production, warehousing and shipping departments.

EACH STUB TELLS THE TRUTH! From production through shipping and everywhere in between, the disciplined removal and matching of Dennison Print-Punch Ticket stubs compiles an accurate history of each TV set's movement and location.

"Lost" TV sets used to be a Philco problem. "Paper losses" were not uncommon. They were caused by misprinted, mislaid or misread tags. Since 1956, however, all that has been changed. Annual inventory losses have been reduced by 93% to 96% . . . thanks to a Dennison Print-Punch System.

Now . . . accurate finished goods control is automatic! Production receives its daily supply of 8-stub Print-Punch tickets. Three stubs remain attached to each set and its carton and identify it until sold at retail. The other five stubs, removed at pre-determined points, are automatically processed to provide an accurate history of the set's movement and location. According to Walter Wagg, in charge of the system since its start, "Results are excellent . . . errors are few and easily corrected . . . inventory control is very reliable."

For complete details about Philco's system . . . and other cost-cutting Dennison Print-Punch applications . . . write for our fact-packed brochure. Or, contact the Dennison sales office nearest you.

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Appointed President Of Telecontrol Corp.

Charles J. Lawson, Jr.

Robert W. Hancock, president of Hancock Industries, has announced the president of their newly acquired division, Hancock Telecontrol Corp. Heading the new firm will be Charles J. Lawson, Jr., former director of Manufacturing Services, IBM.

Hancock Telecontrol Corp. will ufacture and market "Telecontrol" production-data equipment.

Univac Sales Head Named by Rem-Rand

J. L. Sturdevant

Joseph L. Sturdevant was named manager of the commercial sales for the Remington Rand Univac Division, Sperry Rand Corp. Sturdevant, who has been with the company since 1949, will be responsible for sales and service of the division's industry marketing group.

Business Calendar

February 13-16 — Third Institute on Information Storage and Retrieval, at the American University, Washington, D. C. Theme: Machine Indexing. For more information contact: Prof. Lowell Hattery, Dir., Center for Technology and Administration, The American University, 1901 F. St., N. W., Washington 6, D. C.

February 27-March 2 — Midwest Seminar and Business Show of the Office Managers Association of Chicago, Conrad Hilton Hotel, Chicago. Write: OMAC, 105 W. Madison, Chicago, Ill.

March 6-8—The first comprehensive American Management Association Data Processing Conference, Statler Hilton Hotel, New York. AMA's seventh annual exhibit will be held in conjunction. AMA, 1515 Broadway, New York 36, N. Y.

April 4-6—10th Annual Meeting and Convention of the National Microfilm Association at the Sherman Hotel in Chicago. Write: Vernon D. Tate, ex. sec., NMA, Box 386, Annapolis, Md.

April 17-21—The Business Equipment Exposition, third major equipment show sponsored by the Office Equipment Manufacturers Exhibits, Inc., at New York Coliseum. Write OEME Headquarters: 777 14th St., N. W. Washington 5, D. C.

May 7-11 — Forty-Second International Conference and Office Exposition of the National Office Management Association, Kiel Auditorium, St. Louis, Missouri. Write: Field Service Division, NOMA, Willow Grove, Pa.

June 28-30 — Tenth Anniversary Conference of the National Machine Accountants Association, Royal York Hotel, Toronto, Ontario, Canada. More information: NMAA International Headquarters, 1750 West Central Road, Mount Prospect, Ill.

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EDITORIAL

Away With "Intangibles"

The difficulty of selling management on the nonclerical advantages of data processing systems was one of the many interesting subjects discussed at our recent round table in Los Angeles (see page 28). One of the panel experts suggested that the problem stems chiefly from the tendency to label such advantages as "intangibles." We concur wholeheartedly.

It should not be difficult to understand management's reluctance to wax enthusiastically over any advantages described in such a nebulous fashion as "intangible," especially when the enthusiasm would also require the tangible support of a considerable expenditure of dollars.

Profit is the prime purpose of most corporations. Any advantages that affect the profit picture must be expressed in dollars and cents. This is one reason why management responds favorably to systems changes that promise reductions in personnel.

There is general agreement that the greatest potential for significant savings with EDP does not involve clerical replacement. Far greater are savings in valuable and measurable time and space: invoices mailed within hours of the shipment; statements mailed on closing day; profit and loss statements on a daily basis; reductions in inventory; elimination of production delays and countless other advantages made possible by modern data processing techniques represent tremendous dollar savings.

For some reason systems people seem content to label these realities as "intangibles" rather than make the effort to establish a specific price tag on each item. True, it is not always an easy task to establish these values, but without them, it is impossible to evaluate a systems proposal.

Management can't save—or spend—intangibles. They deal with items of estimable value. The world "intangibles" is one that might well be dropped from the systems man's vocabulary.

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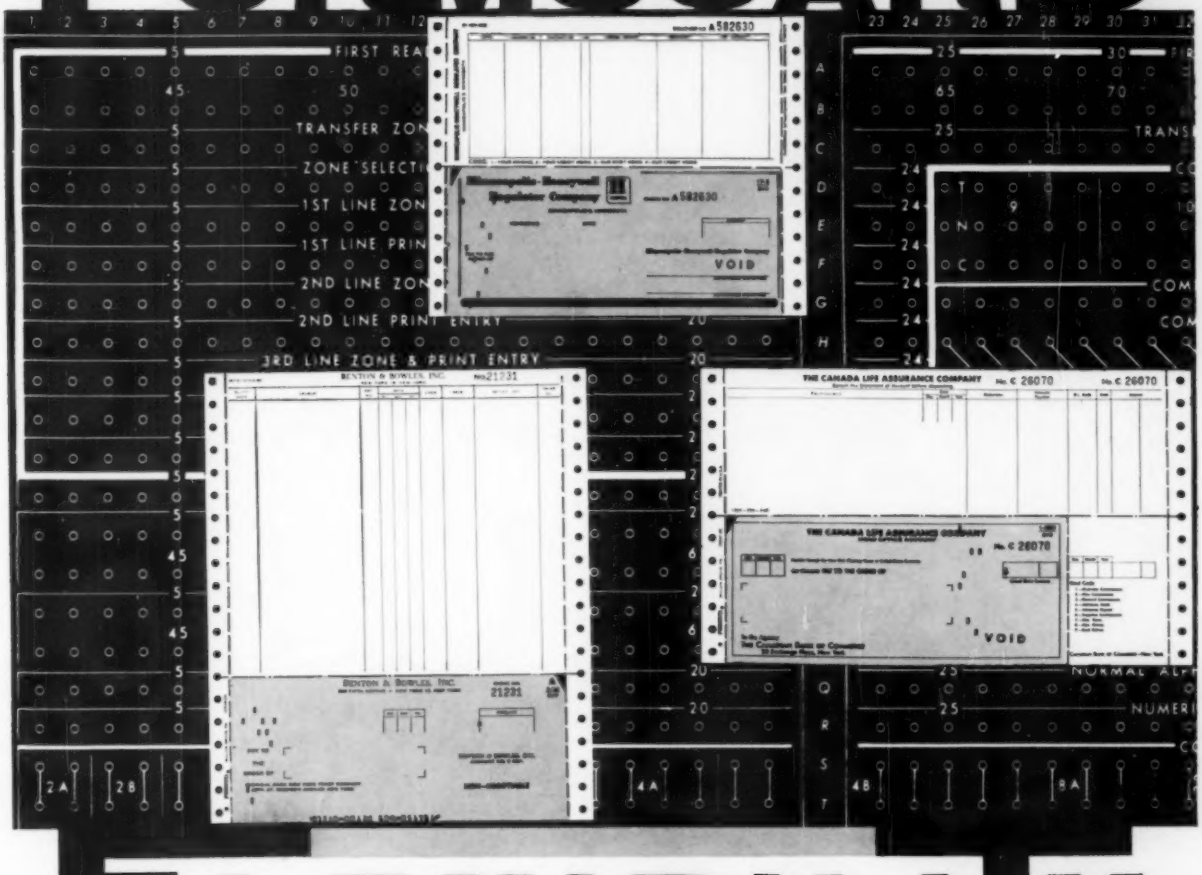

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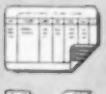

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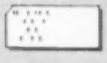

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